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Addendum

CONTRIBUTION OF UNIDO TO THE LITERATURE ON INDUSTRIAL PROJECT APPRAISAL USING SOCIAL COST-BENEFIT ANALYSIS: AN ANNOTATED LIST OF PUBLICATIONS PREPARED BY UNIDO*

Evaluation of industrial projects. (Project formulation and evaluation series, no. 1)
Sales no.: E.67.II.B.23.

Contains, *inter alia*, articles on: "General criteria of industrial project evaluation" (A. K. Sen); "Problems of commercial and national profitability" (C. D. Foster); "The rate of interest and the value of capital with unlimited supplies of labour" (S. A. Marglin); "Shadow prices in industrial project evaluation" (J. S. Flemming); "Survey of literature on cost-benefit analysis for industrial project evaluation" (A. C. Harberger).

Sen, A. The role of policy-makers in project formulation and evaluation. *Industrialization and productivity*, Bulletin 13.
Sales no.: E.69.II.B.3.

Discusses ways in which project evaluation is linked to policy decisions at the overall planning level.

Dasgupta, P. An analysis of two approaches to project evaluation in developing countries. *Industrialization and productivity*, Bulletin 15.
Sales no.: E.70.II.B.10.

Shows the relationship between the UNIDO *Guidelines* and the OECD-sponsored *Manual of Industrial Project Analysis in Developing Countries*, by I. Little and J. Mirrlees (1969).

Guidelines for project evaluation. (Project formulation and evaluation series, no. 2)
Sales no.: E.72.II.B.11.

Written by P. Dasgupta, A. Sen and S. Marglin and known as the UNIDO *Guidelines*, this book has become a standard reference on the subject. It is concerned mainly with conceptual problems in project evaluation in developing countries and their basis in the theory of welfare economics, rather than with practical application.

Cherval, M. Project evaluation by the "effects" method in developing countries. *Industrialization and productivity*, Bulletin 20.
Sales no.: E.73.II.B.8.

*Listed by date of publication and excluding papers in this issue of *Industry and Development*.

_____ Exercise in the application of the "effects" method. *Industrialization and productivity,* Bulletin 20.

Sales no.: E.73.II.B.8.

Present an evaluation method contradictory in many respects to the more common approach of cost-benefit analysis represented by the UNIDO *Guidelines,* Little and Mirrlees *Manual* and, more recently, Squire and van der Tak, *Economic Analysis of Projects* (Baltimore, Johns Hopkins, 1975).

Schwartz, H. *and* R. Berney, *eds.* Social and economic dimensions of project evaluation. Washington, Inter-American Development Bank, 1977.

Papers and proceedings of a meeting held in 1973, sponsored jointly by IADB and UNIDO, focused on issues raised in the UNIDO *Guidelines* and its relationship to the Little-Mirrlees approach.

Industry and development, no. 1.

Sales no.: E.78.II.B.1.

Contains articles on evaluation of capital inflows (D. Lal) and on evaluating regional co-operation projects (A. Kuyvenhoven and L. Mennes, and M. Franco).

Guide to practical project appraisal. Social benefit-cost analysis in developing countries. (Project formulation and evaluation series, no. 3)

Sales no.: E.78.II.B.3.

Written by J. Hansen with the aim of showing how the UNIDO *Guidelines* may be applied in practice. Apart from being less concerned with theoretical issues than the *Guidelines,* Hansen divides the evaluation process into five stages presented in tabular form.

Manual for the preparation of industrial feasibility studies.

Sales no.: E.78.II.B.5.

Although concerned with project preparation rather than evaluation, this book is intended to complement the UNIDO *Guidelines.*

Schydlowsky, D. The design of benefit-cost analysis of investment projects in Peru. *Industry and development,* no. 2.

Sales no.: E.79.II.B.1.

Shows how the general methodology of the UNIDO *Guidelines* and Little-Mirrlees *Manual* may be adapted to fit circumstances particular to Peru.

Practical appraisal of industrial projects: application of social cost-benefit analysis in Pakistan. (Project formulation and evaluation series, no. 4)

Sales no.: E.79.II.B.5.

Written by J. Weiss, this study applies in slightly modified form the *Guide to Practical Project Appraisal* to the evaluation of three industrial projects in Pakistan.

Manual for evaluation of industrial projects.

Sales no.: E.80.II.B.2.

Provides a simple, easy-to-apply evaluation framework closer in concept to the "effects" method than to the UNIDO *Guidelines.* Sponsored jointly by UNIDO and the Industrial Development Centre for Arab States.

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No. 5

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AIMS AND SCOPE OF *INDUSTRY AND DEVELOPMENT*

The journal *Industry and Development* is published twice a year, in English, French and Spanish, as an integral part of the work programme of the International Centre for Industrial Studies (ICIS) of UNIDO. The journal is prepared under the general guidance of a Supervisory Panel, composed of ICIS staff members and chaired by the Head, Global and Conceptual Studies Section. For this issue the supervisor was J. Cody.

Industry and Development attempts to provide a link between practitioners and theorists working on economic and related aspects of industrialization. The focus of the journal is on applied economics, particularly in areas emphasized in the Lima Declaration and Plan of Action on Industrial Development and Co-operation.

The Supervisory Panel welcomes the opinions and comments of its readers.

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Preface

As this issue of *Industry and Development* is being prepared for publication, UNIDO is holding its Third General Conference, in New Delhi, and a strategy for the Third United Nations Development Decade is being formulated within the United Nations system. The first article in this issue, written by Henk C. Bos, is particularly relevant to these deliberations. Bos examines the aims on which the strategy for the Third Development Decade will focus, the industrialization record during the 1970s, changing views on the role of industry, industrial policies needed for the 1980s and implications of the target adopted at the Second General Conference of UNIDO at Lima in 1975. Given the Lima target, structural changes in industry during the 1970s, reassessment of the aims of industrialization and increasing differences in level of development among the developing countries, the need for a balanced reappraisal of policies is becoming increasingly apparent. To achieve the Lima target, substantial increases in resources and improved resource management will be required; but efforts to achieve it "the wrong way"—by draining agricultural resources, neglecting non-economic aims of industrialization, pushing growth in the most advanced developing countries at the expense of others or discouraging growth in the developed countries (contributing mathematically to target achievement but also probably having a negative effect on industrial expansion in the developing countries)—should be avoided.

Improved methods of planning and identifying desirable investments will contribute towards successful achievement of the Lima target and the aims of the Third Development Decade. The paper by Arie Kuyvenhoven summarizes "state-of-the-art" techniques and focuses especially on the potential usefulness of the semi-input-output method, a method until now little known, which provides a bridge at the sectoral level between overall and project planning (for a brief description, see the review in this issue of Kuyvenhoven's book on the subject). John Weiss examines in his paper the extent to which social cost-benefit analysis, designed primarily for public-sector projects, may be extended to the appraisal of foreign investments. He argues that cost-benefit analysis can assist Governments in assessing foreign investments, but that problems related to technology, bargaining power, transfer pricing and externalities may make analysis difficult in practice. A polyester staple fibre project is evaluated.

Industrialization in the Philippines and the United Republic of Tanzania is examined in the papers by Barend A. de Vries and David A. Phillips. De Vries shows why a country in transition from import substitution to export promotion, such as the Philippines, needs to maintain a balance between industries producing for export and those producing for the home market. Such a balance will result not only in greater efficiency and high output growth, but also in increased employment and development of skills, linkages with other sectors, especially agriculture, geographical decentralization and development of small industries. De Vries focuses on import restrictions, fiscal incentives and export promotion measures, but argues that strengthening institutions and other measures should also be considered within an

industry-specific planning framework. Phillips traces the transformation of the Tanzanian economy from colonial times to the present and shows how choice of technology is related to and largely dictated by policies and planning targets determining the composition of output. He argues that industrial strategy should focus on the development of the engineering and basic heavy industries, sectors with the potential for strengthening domestic interindustry linkages while allowing considerable scope for choosing efficient labour-intensive technologies.

The paper by Felix Paukert, Jiri Skolka and Jef Maton is one of many prepared for the Seventh International Conference on Input-Output Techniques, held in April 1979 under the sponsorship of UNIDO and the Austrian Government (a list of conference papers is available upon request; the proceedings are to be published later this year). Using an input-output model,[1] the authors attempt to quantify, for Iran, Malaysia, the Philippines and the Republic of Korea, the effects on employment of hypothetical shifts in income distribution. In the Republic of Korea more equal income distribution is shown to have little effect on employment; but in the other three countries, where distribution of income is less equal, increased equity affects employment positively, mainly through reduction of the saving-income ratio and shifts in the pattern of consumption towards more labour-intensive products.

[1] For an interesting generalization of this type of model, see G. Pyatt and J. Round, "Accounting and fixed-price multipliers in a social accounting matrix framework", *Economic Journal*, vol. 89, December 1979. The paper is also part of the input-output conference documentation.

EXPLANATORY NOTES

References to dollars ($) are to United States dollars, unless otherwise stated.

A slash between dates (e.g., 1970/71) indicates a financial or academic year.

The use of a hyphen between dates (e.g., 1960-1964) indicates the full period involved, including the beginning and end years.

The following forms have been used in tables:

Three dots (. . .) indicate that data are not available or are not separately reported.

A dash (–) indicates that the amount is nil or negligible.

A blank indicates that the item is not applicable.

The following abbreviations are used in this publication:

ARI	accounting rate of interest
DRC	domestic resource cost
FY	filament yarn
GDP	gross domestic product
GNP	gross national product
GVA	gross value added
ICOR	incremental capital output ratio
IRR	internal rate of return
Kb	book value of fixed assets
MVA	manufacturing value added
N	employment
NPV	net present value
NSB	net social benefit
ODA	official development assistance
PFI	private foreign investment
PSF	polyester staple fibre
SCF	standard conversion factor
SIOM	semi-input-output method
SITC	Standard International Trade Classification
VA	value added

Organizations

BOI	Board of Investments (Philippines)
IBRD	International Bank for Reconstruction and Development
ILO	International Labour Organisation
IMF	International Monetary Fund
NCSO	National Census and Statistics Office (Philippines)
OECD	Organisation for Economic Co-operation and Development
OPEC	Organization of the Petroleum Exporting Countries
UNCTAD	United Nations Conference on Trade and Development

The role of industry and industrial policies in the Third Development Decade

*Henk C. Bos**

In early 1979, while the International Development Strategy for the Second United Nations Development Decade was drawing to a close, preparations for a new strategy for the 1980s, the Third Development Decade, were beginning within the United Nations system.

The new strategy cannot be an updated version of the strategy for the Second Development Decade, for the world has changed since 1970, both factually and in ideas, priorities and aspirations.

During the 1970s, important economic, social and political developments and global structural changes took place. The international monetary system based on the agreements of Bretton Woods collapsed and was replaced by a still-evolving system of flexible exchange rates. The period of high economic growth and rapidly expanding international trade for the industrialized countries, which started in the 1960s, was replaced by a period of economic stagnation, unemployment and inflation in most of these countries; and this situation stimulated tendencies towards new protectionism. The quadrupling of the oil price by the OPEC countries in 1973 had a major impact on the structure of the international financial flows and on the balance-of-payments situation of various groups of developed and developing countries. Indirectly, the energy problem complicated relations between the industrialized countries, the oil-producing and the oil-importing developing countries, raising new and different issues for each of them. The economic differentiation of developing countries was accentuated further by the emergence of a small, though increasing, number of newly industrializing countries, characterized by rapid economic growth based on export-oriented industrialization strategies, while the least developed and other low-income countries, which account for the larger share of the population of the developing countries, continued to be characterized by slow growth, increasing unemployment, mass poverty and a weak international position.

Analyses of the experience with past development policies have resulted in new proposals for what are expected to be more relevant policy objectives and more effective policy means. It is recognized that narrow-growth policies have had limited results, that policies must be designed to meet more directly the basic needs of the low-income groups of the population and that mass poverty must be attacked directly and less reliance placed on trickling-down processes. Likewise, the dangers of prolonged import-substitution policies combined with trade protection have increasingly been recognized, and shifts to outward-looking industrialization policies are taking place.

Politically, the developing countries have pushed a new approach to solving the development problem: giving priority to the establishment of a new international

*Professor of Development Planning at Erasmus University Rotterdam; member of the United Nations Committee for Development Planning. The author benefited from comments by members of the Netherlands National Advisory Council for Development Co-operation on parts of this article.

economic order based on national and international collective self-reliance and on recognition of the increased interdependence of the world economy. The analysis of the scope and implications of this new approach has still to be elaborated, but the aspirations embodied in this broad concept will undoubtedly play a crucial role in the negotiations on a new development strategy and in other North-South dialogues.

Preparations for a new strategy for the Third Development Decade

The United Nations General Assembly in its resolution 33/193, adopted on 29 January 1979, provided the basis for an international development strategy for the Third United Nations Development Decade.

According to this resolution, the new strategy should be designed to promote the development of the developing countries and should be formulated within the framework of the new international economic order. It should specify goals and policy measures to be pursued by both developed and developing countries.

These goals include the following:

(a) Bringing about far-reaching changes in the structure of world production;

(b) Increasing substantially food and agricultural production;

(c) Developing institutional and physical infrastructure in the various sectors in the developing countries;

(d) Promoting industrialization in these countries and ensuring progress towards achieving the Lima target (share of developing countries in world industrial production to be 25 per cent by the year 2000);[1]

(e) Improving the terms of trade of developing countries by increasing their share in world exports and extending to them preferential treatment;

(f) Increasing substantially the flow of resources in real terms to the developing countries;

(g) Making the international monetary system more responsive to the needs and interests of the developing countries;

(h) Promoting the transfer of technology to developing countries and taking positive measures to develop indigenous capacity in science and technology in these countries.

The final aim of development must be to increase constantly the well-being of the entire population on the basis of its full participation in the process of development and a fair distribution of the benefits therefrom. The strategy should therefore, reflect the need for individual countries to adopt suitable policies for promoting social development within the framework of their development plans and priorities. The strategy should also, according to the resolution, contribute to the promotion of national and collective self-reliance of the developing countries, to be attained through economic and technical co-operation among themselves.

[1] Contained in the Lima Declaration and Plan of Action on Industrial Development and Co-operation. Available as UNIDO Public Information Document PI/38.

Particular attention should be paid to the problems of the least developed,[2] the most seriously affected,[3] land-locked and island developing countries. Special measures must be taken to deal with these problems.

To assist the Preparatory Committee for the new International Development Strategy in setting quantitative targets for the 1980s, the United Nations Secretariat has formulated alternative scenarios within a quantitative framework for the developing countries as a whole and for various groups of developing countries.[4] Four scenarios are distinguished.

The first scenario assumes a continuation of past policies and performance of the developing countries, except for an optimistic assumption about their future investment share in gross domestic product (GDP).

The second scenario sets a target of doubling the *per capita* income of the low-income countries by the year 2000. For the sake of this analysis, this group of countries has been defined as all countries with *per capita* income below $300 (in 1975 prices). This target would imply a radical acceleration of the rate of growth of the *per capita* GDP of these countries from 1.3 to 3.5 per cent per annum. It would limit the growing disparities among groups of developing countries.

The third scenario extends the assumption of improved growth performance to slow-growing, middle-income developing countries.

The fourth scenario assumes that a further significant acceleration in the rate of economic growth will be brought about by a substantial increase in the rate of investment. This scenario would lead to the highest growth rates in total output and in industrial production and may be regarded as a large step towards the Lima target. It implies radical changes, both in domestic policies of developing countries and in international policies.

The main results of these projections for all developing countries and for the group of developing countries with *per capita* income below $300 are given in table 1. Comparison of the growth rates of the scenarios 2-4 with the expected performance for the 1970s indicates the substantial changes required to achieve the assumed objectives.[5]

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[2] Category defined by General Assembly resolution 2768 (XXVI). See also A/AC.176/7, Article 24.

[3] Category defined by General Assembly resolution 3202 (S-VI), section X as follows:

> "*(c)* The countries which have been most seriously affected are precisely those which are at the greatest disadvantage in the world economy: the least developed, the land-locked and other low-income developing countries as well as other developing countries whose economies have been seriously dislocated as a result of the present economic crisis, natural calamities and foreign aggression and occupation."

[4] United Nations Economic and Social Council, "Elements in an international development strategy for the 1980s. Some alternative rates of economic growth and their broad policy implications" (23 February 1979) (E/AC.54/19).

[5] Comparison of the projections prepared by the United Nations Secretariat with those presented in *World Development Report 1979* (World Bank, Washington, D.C.) illustrates the fundamental difference in approach between both institutions in projecting future developments. The World Bank projects an average annual GDP growth of 5.6 per cent (with high and low alternatives of 6.6 and 4.8 per cent, respectively) for all developing countries over the period 1980-1990. The comparable rates of growth projected by the United Nations Secretariat range from 6.5 to 7.6 per cent.

Table 1. Estimated historical and projected annual rates of growth of GDP, economic sectors, foreign trade and investment shares for four scenarios, 1980-1990

(Percentage)

Item	Estimated growth, 1970-1980	Scenario, 1980-1990[a]			
		1	2	3	4
All developing countries					
Gross domestic product	5.6	6.5	6.9	7.0	7.6
Agriculture	2.8	2.7	3.4	3.4	3.5
Industry	7.2	8.3	8.6	8.7	9.4
Services	5.9	6.3	6.6	6.8	7.3
Exports	3.5	5.4	5.7	5.8	6.5
Imports	7.7	9.3	8.0	8.3	9.5
Share of investment in GDP	17.5[b]	20.3	21.3	22.2	24.7
Developing countries with *per capita* income below $300					
Gross domestic product	3.5	3.9	5.8	6.1	6.2
Agriculture	2.1	2.1	3.6	3.6	3.6
Industry	5.1	5.8	8.5	9.1	9.3
Services	4.6	4.7	6.5	6.8	7.0
Exports	3.9	4.0	5.6	5.8	6.1
Imports	3.2	5.0	9.5	11.1	12.1
Share of investment in GDP	18.6[b]	19.7	25.1	27.1	27.3
Developed market economies					
Gross domestic product	3.5	3.9			
Centrally planned economies					
Net material product	...	5.0			

Source: United Nations Economic and Social Council, "Elements in an international development strategy for the 1980s. Some alternative economic growth rates and their broad policy implications" (23 February 1979) (E/AC.54/19).

[a] For an explanation of the four scenarios, see text.

[b] Actual share, 1961-1974.

Industrial performance and structural change during the 1970s[6]

A brief review of the experience with industrialization during the 1970s provides a useful starting point for discussing new objectives and industrial policies for the 1980s.

The strategy for the Second Development Decade set an average growth target of 8 per cent per annum for manufacturing output for the developing countries as a whole in order to support an average growth target of 6 per cent per annum for total GDP. Statistical data for the period 1970-1977 indicate that net manufacturing output increased at an average annual rate of 7.7 per cent, with a 6 per cent annual growth rate for GDP. Because a deceleration in growth was projected for the final years of the decade, the average annual growth rates for the period 1970-1980 were

[6] Statistical data for this section are, in addition to the sources quoted, taken from *World Industry since 1960: Progress and Prospects* (United Nations publication, Sales No. E.79.II.B.3) and other United Nations publications.

estimated at 7.5 per cent for manufacturing value added and 5.6 per cent for GDP (in 1970 prices). During the preceding decade (1960-1970) net manufacturing output increased at an average annual growth rate of 7 per cent and GDP at about 5.5 per cent. The conclusion must be that the realized growth rates for net manufacturing output and for total GDP can be expected to remain below the targets set for the 1970s; however, compared with growth rates during the 1960s, a notable acceleration in growth took place in manufacturing.

Industry did not progress uniformly in all developing countries. On the contrary, the average manufacturing growth rates diverged widely among various groups of countries, more or less in line with the divergence in GDP growth rates. Not surprisingly, the least developed countries had the lowest growth rates, the countries in West Asia (see table 2) the highest.

Table 2. Average annual rate of growth in manufacturing for developing market economies, 1970-1976

(Percentage)

Country grouping or region	*Rate of growth*
Least developed and other low-income countries	4.7
Least developed	2.5
Other developing countries	8.8
Petroleum-exporting	11.6
Non-petroleum-exporting	8.4
Africa	7.0
West Asia	15.2
South and East Asia	8.7
Western hemisphere	7.3
Average for developing market economies	8.1

Source: "Review of progress made in the implementation of the International development strategy" (6 March 1979) (E/AC.54/22/Add.1), table 6.

Manufacturing production in developing countries was concentrated in a few countries in Latin America (Argentina, Brazil, Mexico) and in South and South-East Asia (India, Republic of Korea), countries in which a large share of the developing world's population is concentrated. Industrialization proceeded, however, in a broader range of countries.

Non-durable consumer goods, such as food products, textiles, clothing, leather and wood products, dominated in total manufacturing production for most developing countries; but in countries where industrialization was sufficiently advanced (Brazil, India, Republic of Korea) the production of intermediate and capital goods increased in importance. Between 1955 and 1976, the share of light industry in total manufacturing production decreased from 67.3 to 48.9 per cent. The share of the developing countries in world production of consumer goods nevertheless increased.

The exports of manufactures from developing countries expanded rapidly, in volume more than 12 per cent per annum between 1970 and 1976. This trade

expansion was an important source of the growth in manufacturing production, in particular for the smaller countries. The trade structure of the developing countries was also affected by this expansion. The share of manufactured products (SITC 5-8) of the developing countries in total merchandise exports, excluding fuel (SITC 3), increased from 19.5 per cent in 1960 to 35 per cent in 1970 and 45 per cent in 1976. The industrialized countries were the most important market for the manufactured products of the developing countries, with a share of 69.6 per cent in 1970 and 65.6 per cent in 1976. The share of trade among the developing countries amounted to 26.2 per cent in 1970 and increased to 31.1 per cent in 1976. The remaining share, 4.2 per cent in 1970 and 3.3 per cent in 1976, was for the centrally planned economies. These trends were partly due to slower growth in the developed countries.

A very few countries accounted for the preponderance of exports of manufactured products from developing countries, though the importance of small countries in East and South-East Asia was much larger than for production. Hong Kong, Republic of Korea, Singapore were, next to Brazil, India and Mexico, among the most important exporting countries. Rapidly rising in importance were Malaysia and Thailand. The African countries south of the Sahara (with the exception of Nigeria) made little progress in industrialization, both in terms of production and exports.

The exports of manufactures included mainly labour-intensive products of light industry (textiles, clothing, leather and wood and electronics products). The share of the developing countries in the imports of manufactured products of the developed countries was small. It amounted to 11.5 per cent for the OECD countries in 1975 (SITC 5-8) and 9.1 per cent in 1976. The important shares for individual industrialized countries, however, differed widely. They were high for Japan and the United States of America (24.2 and 21.6 per cent, respectively, in 1975) and low for Canada, France and Netherlands (3.8, 8.6 and 3.5 per cent). The import penetration was, of course, higher for the commodity groups exported by the developing countries. The share of the developing countries' products in the apparent consumption of manufactured goods by the developed countries was much lower than their share in imports.[7] The World Bank, using slightly different classifications of countries and commodities, estimated for 1976 the share in imports at 9.9 per cent and the share in consumption at 1.6 per cent. Both shares are expected to rise by 1990 to 15.8 and 4.0 per cent, respectively.[8]

The employment created in the industrial sector was disappointing, except in countries with rapid manufacturing growth, usually based on export-oriented industrialization strategies.

Changing views on the role of industry

The views on the role of industry in development have changed during the past decades. Until the middle of the 1960s, industrialization, supported by transfers of capital and know-how, was considered the most important means of modernizing the

[7] For a recent analysis of these trends, see OECD, *The Impact of Newly Industrialising Countries on the Pattern of World Trade and Production in Manufactures* (Paris 1979). The figures quoted exclude Greece, Iceland, Portugal, Spain and Turkey from the group of OECD countries.

[8] World Bank, *op. cit.*, p. 21.

economies of the developing countries, thus following the development pattern of the industrialized countries. Disappointing results, in particular the slow growth of agricultural and food production, increasing unemployment and insufficient capital transfers, shifted in the second half of the 1960s the emphasis from industrialization towards the promotion of agriculture, employment and international trade ("trade not aid", green revolution). Since the early 1970s, new development objectives related to more equitable income distribution, elimination of poverty and the satisfaction of basic needs have received greater emphasis, second only to the goal of rapid economic growth, if not replacing it. Thus, industrialization is no longer generally considered of central importance for development; it is sometimes even evaluated negatively. The need for reorienting industrial policies, however, is widely recognized. Such an orientation should be a balanced one. Experience has shown that one-sided policies, based on too negative evaluations of past policies and too great hopes placed on new ideas and approaches have resulted in disappointments and, thus, again in policy changes.

A reorientation of industrial policies should take into account the positive and negative experience gained under various conditions. New policies should above all be formulated with the aim of maximizing the contribution of industry towards accelerating economic growth; creating productive employment, with special attention being paid to the poorest countries and the poorest groups of the population; and fostering the self-reliance of the developing countries, both nationally and collectively.

Positive functions

Industrialization is in the long run the most important source of economic growth, which is the basis of development. For the poorest countries, an increase in agricultural production is usually the most important factor stimulating economic growth. When a certain minimum level of development is reached, however, industrial production increases in the long run more rapidly than other sectors, until a high level of *per capita* income is reached above which the services sector tends to grow more rapidly. Between these limits the share of industry in total GNP increases, while the share of agriculture declines. These tendencies have been amply established by studies based on broad historical and international experience, in particular those of S. Kuznets and H. B. Chenery. Industry stimulates both the growth of other sectors and international trade, which enlarges the possibilities for economic growth, in particular for small countries. Table 3 shows the strong association between the rates of growth of GDP and agricultural and manufacturing output.

Industrialization may enable a country to earn foreign exchange, especially if the country pursues a policy based on export promotion. A policy of import substitution usually does not lead to net foreign exchange savings, since it stimulates the demand for imports of capital goods and intermediate industrial products. These negative balance-of-payments effects are clearly illustrated by the experience of many developing countries, in particular those in Latin America during the 1950s and 1960s. They have enforced the already existing protectionist tendencies.

Industrialization promotes stability of development by making the economy less dependent on uncontrollable fluctuations in production, prices and revenues of primary commodities through diversification of the economic structure.

Table 3. Average annual growth rates of value added of manufacturing and agriculture, 1960-1970 and 1970-1977

(Percentage)

Country	Manufacturing		Agriculture		GDP	
	1960-1970	1970-1977	1960-1970	1970-1977	1960-1970	1970-1977
With high manufacturing growth rate						
Malaysia	...	12.3	...	5.4	6.5	7.8
Pakistan	9.4	2.2	4.9	1.8	6.7	3.6
Republic of Korea	17.2	19.3	4.5	5.0	8.5	10.4
Senegal	4.6	10.2	1.9	5.2	2.6	2.8
Thailand	11.0	11.2	5.5	4.4	8.2	7.1
Tunisia	...	12.2	...	6.9	4.6	8.4
With low manufacturing growth rate						
Argentina	5.7	3.0	2.3	2.7	4.2	2.9
Egypt	4.7	5.7	2.9	3.1	4.5	7.9
India	4.8	4.1	1.9	4.1	3.6	3.0
Jamaica	5.6	0.6	1.5	1.2	4.6	0
Philippines	6.7	6.8	4.3	4.8	5.1	6.4
Sri Lanka	6.3	1.6	3.0	1.6	4.6	3.1
Uruguay	1.5	2.7	1.9	0.2	1.2	1.6

Source: Compiled from data in "World development indicators", in *World Development Report 1979* (Washington, D.C., World Bank), annex.

Industrialization gives a strong stimulus to improving the training of the labour force. An increasing supply of qualified labour, not only in technology, but also in finance, accounting, marketing, management and above all, a supply of entrepreneurs, is a requirement for successful industrialization. This investment in human resources widens the opportunities for productive employment; it raises the average income and has important external effects on the whole economy.

Industrialization is in the long run an important source of employment, as experience shows. Within the limits mentioned earlier in connection with economic growth, the share of industry in the total labour force tends to increase systematically with the average *per capita* income.

In the short run the employment potential of industrialization can be less evident. For example, the average labour productivity in industry is usually higher than in agriculture, which is reflected in a lower share of industry in the labour force than in the national product (see table 4). This difference in productivity makes it necessary for industry to grow much more rapidly than agriculture to absorb the labour surplus of the agricultural sector. The shift from traditional labour-intensive to modern capital-intensive industries and technologies is another factor explaining the unsatisfactory employment effects of industrialization in the short run. The importance of rapid industrial growth in creating employment is illustrated by table 4. The countries with high manufacturing growth show substantial increases in the share of industry in the labour force, while for the countries with low manufacturing growth rates the changes in this share are small or negative (except for Egypt).

Industrialization can also be viewed as a means of creating new relations between developing and developed countries. Analysis of the Lima target shows that accelerated industrialization in the developing countries will have an impact on global production and the structure of world trade, the interregional flows of goods and services, capital and technology. It should, however, not be forgotten that these changes in international relations will have to be seen as a means of achieving the final goal of raising the living standards of the developing countries, and of the poorest countries and groups of population in particular, and not as an end in itself.

Table 4. Share of industry and manufacturing in GDP and of industry in labour force, 1960 and 1977

(Percentage)

Country	Share in GDP				Share of industry in labour force	
	Industry[a]		Manufacturing[b]			
	1960	1977	1960	1977	1960	1977
With high manufacturing growth rate						
Malaysia	18	29	9	18	12	20
Pakistan	16	23	12	16	18	20
Republic of Korea	19	35	12	25	9	33
Senegal	20	24	12	...	5	9
Thailand	18	29	11	20	4	8
Tunisia	18	32	8	11	18	23
With low manufacturing growth rate						
Argentina	38	45	31	37	36	29
Egypt	24	30	20	24	12	26
India	20	25	14	16	11	11
Jamaica	36	37	15	19	25	27
Philippines	28	35	20	25	15	15
Sri Lanka	16	21	11	15	13	15
Uruguay	28	36	21	29	29	32

Source: Compiled from data in "World development indicators", in *World Development Report 1979* (Washington, D.C., World Bank), annex.

[a] Including mining, manufacturing, construction and gas, electricity and water.

[b] Belongs to the industrial sector, but its share in GDP is shown separately, since it is typically the most dynamic element in the industrial sector.

Negative effects

Industrialization has also had negative effects. Some samples have already been given: negative balance of payments and development effects resulting from prolonged import-substitution policies combined with protection measures; failure to create sufficient new jobs owing to inward-looking economic policies resulting in slow industrial growth or to overly capital-intensive industrialization patterns. Other negative effects can be cited.

Industrialization has often taken place at the expense of the agricultural sector. Industry and agriculture, together with other sectors, are always competing for the same resources, both of national or international origin. Governments often find it more convenient and attractive to give priority to policies favouring industrial development rather than engaging in the complex task of developing the agricultural sector. This is particularly so when industrialization is based on foreign direct investment.

Industrialization has often strengthened a dualistic structure of the economy by implanting modern industries and technology in a traditional society. This may disturb the balance in the labour market or in the wage structure; it also may destroy local technological know-how without building up at the same time a new basis of indigenous technology.

Industrialization has contributed to highly unbalanced urbanization. In most developing countries the population and non-agricultural sectors are not dispersed among cities of varying size, as in the developed countries, but are concentrated in a few large centres, often only the capital. If left to itself, this situation creates a self-propelled process of concentration of population and industries. New industries find the locational advantages of infrastructure, markets, labour supply in the existing cities; and labour migrates from the countryside to these cities in the expectation of finding employment, higher wages and better living conditions. The results are often the opposite.

Other negative effects include greater inequality in distribution of income; increased dependence on foreign firms, technology and markets; and environmental disturbances or destruction.

These negative consequences are not necessarily linked with industrialization, just as the positive effects do not always occur. Most of the negative effects result from specific development and industrialization policies and could have been prevented or reduced if the Government or the private sector had pursued different policies. Where certain negative effects seem inevitable, they should be compensated for by other positive effects so that industrial activities can be justified from a socio-economic point of view. It should also be explored whether the aims of development could be achieved through better means than industrialization.

Industrial policies required in the 1980s

What can be the role of industry for the developing countries during the coming Third Development Decade, and what industrial policies should be considered appropriate? These questions, of course, can be answered only in general terms. One outstanding experience of the past decade is the increasing differentiation in economic growth and structure among groups of developing countries. There exists, therefore, no uniform pattern or policy for industrialization applicable to all developing countries or groups of countries. Patterns and policies will differ according to the stage of development; economic opportunities, as determined, among other things, by the size of the country and natural and human resources available; and political priorities. Nevertheless, some general recommendations can be formulated, based on past experience and widely prevailing current views on broad development policies. They are briefly described below.

The relative size and character of the industrial sector and industrial policies must be determined on the basis of the contribution they can make, directly and

indirectly, in the short run and the long run, to the final aims of development for the developing countries: acceleration of economic growth; creation of productive employment, paying special attention to the lowest-income countries and groups of the population; and promoting self-reliance, both nationally and collectively. Application of this criterion is not always easy. Some of the objectives may be conflicting, and it may be easier to assess direct and short-term effects than indirect and long-term effects of specific policies. Most important is, however, that industrialization measures be systematically and explicitly tested to determine their effects on development. This applies to both national and international measures for promoting industry.

Industry should be viewed as an integral part of overall development and not in isolation from other sectors of the economy, not only because of the complementarities with other sectors, but also because of the need to arrive at a balanced use of scarce resources (finance, manpower and foreign exchange) for which various sectors are competing and to distribute the benefits of development fairly among sectors, regions and population groups. This need for a proper balance applies in particular to the relation between industry and agriculture.

Rapid economic growth remains a crucial condition for development. For developing countries that have recently started to industrialize, manufacturing is the most dynamic sector; in the long run it is a powerful engine for creating and raising incomes, while the long-run marketing possibilities for primary commodities are limited. The growth-propelling function that industry can have should not be lost sight of in a reorientation of industrial policies towards redistributional goals.

Industrial policies should aim at preventing a dualistic structure of the economy, creating a balanced distribution of population and industries over the country, and reducing the gap between the urban and rural areas. Measures to achieve these aims include:

(a) Shifting industry away from the large cities to other areas;

(b) Integrating industry more closely with agriculture and other rural activities;

(c) Placing greater emphasis on the promotion of small and medium-sized firms, to create jobs and to further regional dispersal;

(d) Choosing technology that is appropriate for rural conditions or can be adapted to them (uses locally available natural resources, know-how and labour skills; can be adapted to size of market and local needs);

(e) Orienting rural industries towards meeting the needs of the lowest-income groups.[9]

Not all industries are suitable for such an orientation towards rural development. Other types of industry should also be developed. Modern industries, exclusively oriented towards production of exports and independent of agriculture, could indirectly benefit rural and low-income groups of the population. But experience has shown that a more direct contribution of industrialization to rural development is also needed.

The role of government in industry should be re-examined. The minimum tasks that it is generally agreed that the Government should undertake are the building of the necessary infrastructure and supporting facilities and providing the general

[9] For concrete studies on these aspects, see Economic and Social Commission for Asia and the Pacific, "Re-orientation of industrial policies" (Bangkok 1979).

framework for industrialization through policies related to financing, taxation, location, international trade and competition and through regulations for foreign direct investment, pricing and environment protection. Often, and in particular in the early stages of industrialization, the Government also acts as entrepreneur in setting up and managing public enterprises. When certain industries are considered to be of great importance to the economy and private interest is lacking, such government participation can be useful. But too often inefficient and non-competitive production has been set up in this way, requiring permanent government subsidies without sufficient national benefits.

The limitations of industrialization policies based on import substitution, usually combined with protectionist trade policies and substantial government participation, on the one hand, and the growth and employment creation that can be obtained from policies based on export promotion, on the other hand, have elaborately been illustrated in the economic literature. Each of these policies can produce good results if applied in the appropriate conditions and selectively. Industry A may have to be developed initially through import substitution and protection, while industry B could better switch from supplying the saturated domestic market to exporting abroad, and industry C could be set up from the beginning to produce for foreign markets. Flexibility in approach will be more successful than pursuing oversimplified strategies.

A return to a situation of higher growth rates with less inflation, unemployment and unused capacity in the industrialized countries would, first of all, be in the interest of these countries themselves. But it would also stimulate the developing countries, although more the middle-income than the low-income developing countries. Such an improvement in the economic situation of the industrialized countries would create more favourable conditions for reversing the present trends towards protectionism and shifting to trade liberalization. It would assist developing countries that pursue export-oriented industrialization policies instead of penalizing them. Structural adjustment in the economies of the industrialized countries would be facilitated and become more automatic because new and rapidly growing sectors would be able to absorb labour released from declining industries. A secure and expansive international economic climate might make the Governments of the developed countries more willing to act according to principles of long-term, global interest, rather than the pressure of short-term, national interests.

The Lima target

A major objective of the International Development Strategy for the 1980s, as set forth in General Assembly resolution 33/193, will be, through acceleration of industrialization in the developing countries, to make progress in achieving the target set by the Lima Declaration, namely, that the share of the developing countries in world industrial production should be at least 25 per cent by the year 2000, with industrial growth "distributed among the developing countries as evenly as possible".[10] In regional meetings preceding the Second General Conference of UNIDO, held at Lima in 1975, targets were adopted for the regional shares in industrial world production. The Economic Commission for Latin America (ECLA) adopted a share of 13.5 per cent as a target for Latin America, the Economic

[10] Para. 28. See footnote 1.

Commission for Africa (ECA) a share of 2 per cent for Africa, and the Economic Commission for Asia and the Pacific (ESCAP) a share of 10 per cent for the developing countries of Asia (excluding West Asia). The regional shares amounted in 1975 to 4.8 per cent for Latin America, 0.8 per cent for Africa, 2.5 per cent for South and East Asia and 0.5 per cent for West Asia, together adding up to 8.6 per cent for the developing countries as a whole, excluding the centrally planned developing countries.

The Lima target can be considered, first of all, as a concise expression of a central requirement for reducing the gap between developed and developing countries. To achieve the target, the average *per capita* income in the developing countries must increase more rapidly than in the developed countries. For such a relatively rapid growth, accelerated industrialization in the developing countries is a prerequisite.

The Lima target can further be seen as an expression of the desire on the part of the developing countries to obtain a more equitable global distribution of industrial production between developing countries and the rest of the world. The target also embodies the need for important structural changes, in both production and international trade, for developing and developed countries alike. Rapid industrialization cannot take place without interaction with other sectors, in particular with agriculture, energy and transport. It affects the growth and the structure of international trade, in terms of both commodity composition and interregional relations. The target has also implications for the transfer of financial resources, concessional and commercial, and of technology to the developing countries.

For these reasons, the Lima target should not be considered as a sectoral target for industry, independent of other targets. Its achievement requires a comprehensive integration of policy measures, both within and among countries. This conclusion does not imply that development objectives other than the Lima target are not needed. Although the target embraces indirectly several additional objectives, it fails to mention others, in particular the equitable distribution of the benefits of industrialization among various population groups, with special attention given to the lowest-income groups.

Although the desirability of substantially increasing the share of the developing countries in world industrial production can be readily agreed upon, the choice of a target of a 25 per cent share in the year 2000 raises questions concerning its feasibility and its implications. In scientific analyses the 25 per cent target has been characterized both as "utopian" and as "modest".[11] Several studies have been undertaken, in particular within the United Nations system, that have attempted to estimate the global implications of the 25 per cent target. Further analysis, however, is necessary before a firm opinion can be given on whether the target can be achieved. In the absence of such an analysis, the following comments focus on some aspects of the Lima target that deserve special attention, in particular in connection with problems probably to be faced in the coming decade.

First of all, it should be realized that the Lima target fixes arithmetically a difference in the average annual growth rates of net manufacturing output for the developing countries, on the one hand, and for the rest of the world, including the

[11] For optimistic views on the feasibility of the target, see the articles by H. W. Singer and J. Tinbergen, in *Industry and Development*, No. 3 (United Nations publication, Sales No. E.79.II.B.2).

developed market economies and the developed centrally planned economies, on the other.[12] The size of the difference depends exclusively on the share of the developing countries in world manufacturing production in a chosen base year and the length of the period between the base year and the year 2000. The necessary manufacturing growth rate for the developing countries, therefore, depends directly on the manufacturing growth rate of the rest of the world, but the difference in growth is independent of these rates.[13]

According to recent estimates of the UNIDO secretariat, the share of the developing countries in world manufacturing output amounted to 8.6 per cent in 1975 (and not 7 per cent as assumed in the Lima Plan of Action). It follows then, that the Lima target requires a growth difference of 5.2 per cent between 1975 and 2000 (instead of more than 6 per cent as implied by the Lima Plan). If 1977, with an estimated share of 9.0 per cent, is chosen as a basis, the growth difference amounts to 5.4 per cent. The conclusion is that the Lima target requires a 5-5.5 per cent difference in average growth rates for net manufacturing output depending on which base year of the recent past is chosen. During the period 1960-1975 the growth difference amounted on the average to less than 2 per cent. During the 1960s the share of the developing countries remained fairly stable at about 7 per cent but increased steadily in the 1970s. The stagnating growth of the industrialized economies may also have contributed to this result (see table 5).

Table 5. Share of the developing countries in world manufacturing value added, 1960-1977

(Percentage)

Year	Share	Year	Share
1960	6.9	1969	7.0
1961	7.1	1970	7.3
1962	7.1	1971	7.6
1963	6.9	1972	7.7
1964	7.0	1973	7.9
1965	6.9	1974	8.2
1966	6.8	1975	8.6
1967	6.8	1976	8.6[a]
1968	6.9	1977	9.0[a]

Source: World Industry since 1960: Progress and Prospects (United Nations publication, Sales No. E.79.II.B.3), table II.1.

Note: Since publication of these figures, the following revisions and updating have been made by UNIDO: 1972–7.8; 1974–8.3; 1975–8.7; 1976–8.7; figures for the following years are provisional: 1977–8.8; 1978–8.8; 1979–9.0.

[a] Preliminary figure.

[12] Although the Lima Declaration refers to the share in world industrial production, the Lima target is always interpreted as related to manufacturing output (in value added). Industry includes–in addition to manufacturing–mining, construction and public utilities (gas, electricity and water).

[13] The difference can be shown to be inversely proportional to the period over which the target has to be achieved. If it takes a growth difference of 5 per cent to achieve the target in 25 years, the difference will be 6.25 per cent for a period of 20 years.

The United Nations Conference on Trade and Development (UNCTAD) estimated already in 1976 some of the implications of achieving the Lima target,[14] as UNIDO did in 1979.[15] The results of these studies are summarized in table 6. Although the methodologies and assumptions of these studies differ, they both show required growth rates over the period 1975-2000 for the developing countries substantially higher than those observed in the past: for GDP, between 7.5 and 8.8 per cent, compared with 5.7 per cent during 1960-1975; and for manufacturing output, an average of 9.6-10.5 per cent, compared with a historical growth rate of 7.4 per cent. These results indicate clearly that radical structural changes and policies will be required to make such ambitious growth rates possible.

Table 6. Growth rates of GDP and manufacturing value added, historical trends and alternative scenarios

(Percentage per annum)

Item	Historical growth (actual) 1960-1975	Growth scenarios, 1975-2000			
			UNIDO		
		UNCTAD[a]	Historical growth[b]	Lima	High growth[c]
GDP					
Developed countries	4.9	...	5.6	4.6	4.6
Developing countries	5.7	7.5	6.8	8.8	8.2
Manufacturing value added					
Developed countries	6.0	5.1	5.7	4.9	4.9
Developing countries	7.4	9.6	8.0	10.5	10.1
Share of developing countries in world manufacturing value added at end of period	8.6	25.0	13.9	25.7	23.8

[a] Over the period 1972-2000, based on a share for the developing countries of 9.3 per cent in 1972. This high share, compared with the data in table 5, is partly due to the inclusion of Yugoslavia and Israel in the developing countries.

[b] Projections based on historical growth differ from figures for 1960-1975 because countries with high growth increase their weight in the average for each grouping and because of structural relationships between GDP and MVA explained in annex I of *World Industry since 1960 . . ., op. cit.*

[c] Assumes a growth of GDP for all developing countries 2 per cent higher than historical growth, except for countries that have already achieved high industrial growth rates that are assumed to continue.

The estimated growth rates for the developing countries depend on the assumptions made about the corresponding growth rates for the developed countries, not only for simple arithmetical but for more interesting economic reasons. The UNCTAD and UNIDO studies assume that the future growth rates for these countries will be lower than those observed in the past. J. Tinbergen argues that in the coming decades a further deceleration in industrial growth may be expected to take place in

[14] UNCTAD, *Restructuring of World Industry*, New York 1978 (a report prepared for UNCTAD IV).

[15] *World Industry since 1960 . . . , op. cit.*

the highly industrialized countries and that it may make the achievement of the Lima target easier.[16] Tinbergen points out that for the industrialized countries with high *per capita* incomes the growth rate of the manufacturing sector tends to fall below the growth rate of total GDP, thus implying a decreasing share of manufacturing in total output. If this interesting empirical evidence, which deserves further analysis, is accepted as a basis for future projections, a rate of growth for manufacturing output of 3-4 per cent for the developed countries and, consequently, of 8-9 per cent for the developing countries may be more relevant rates for achieving the Lima target.

Although such a growth rate for manufacturing output might seem less ambitious and therefore more realistic, new issues arise. Can slow overall and manufacturing growth of the developed countries be consistent with high growth in the developing countries? The latter is associated with high growth for manufactured imports, in particular, capital goods, and requires expanding markets for manufactured exports, also in the industrialized countries. Will a manufacturing sector of the developed countries that is growing only slowly be able to meet the developing countries' rapidly growing demand for imports? Will the developed countries be able to adjust their slow-growth economies sufficiently smoothly to absorb increased imports of manufactured products from developing countries? The trade deficits of the developing countries, with their high industrial growth rates, will increase owing to relatively high import elasticities, particularly when industrialization is oriented more to supplying the domestic market. Can sufficient capital be transferred from the developed countries to help finance these trade deficits?

More trade among the developing countries cannot reduce the dependence of these countries as a group on the developed countries, both as markets for exports and suppliers of capital goods, as long as the capital goods sector of the developing countries remains small. Moreover, interdependence with the developed countries will continue to grow in the coming decades. Intensification of intra-regional trade in manufactures for the developing countries, however, could help to change the commodity structure of trade flows. The less industrialized countries that are exporting traditional light industry goods could seek markets in the more industrialized developing countries, which in turn could shift their exports to the developed countries from light industry goods to intermediate and capital goods. These tendencies can already be observed. They enlarge the markets for the developing countries and reduce, relatively, the speed of penetration of the markets of the industrialized countries for the narrow range of traditional, labour-intensive, light-industry goods. They broaden the range of commodities with which the developing countries will penetrate the industrialized markets.

Conclusions

Several conclusions can be drawn from this analysis.

The Lima target should first of all be seen as the aspiration of the developing countries to maximize their industrial growth. This objective would be supported by a return to higher growth in the developed countries. This higher growth, however, would make it very difficult for the developing countries to meet the target of a 25 per cent share in world industrial production by the year 2000 because of the

[16] Jan Tinbergen, "The target of twenty-five per cent for the third world", in *Industry and Development*, No. 3 (United Nations publication, Sales No. E.79.II.B.2), pp. 7-16.

high industrial growth rate implied. With slow growth in the developed countries, the Lima target may imply less ambitious industrial growth for the developing countries, but such a situation would make external bottle-necks in international trade and conflicts with the interests of the developed countries more likely. These problems could be reduced, though not avoided, through a restructuring of the international trade flows, both within the developing countries, based on the opportunities that the increasing differentiation in industrialization level among these countries offers, and between developed and developing countries. More quantitative research on these questions would be desirable.

A final conclusion could be added. Whatever scenario is assumed for the future, and whatever the precise dimensions may be, there is no reason to doubt that the developing countries as a group will continue to industrialize their economies, that they will increase their share in world industrial production and that they will penetrate further the markets of the developed countries with a broadening range of industrial goods. Whether these trends will bring the world closer to achieving the fundamental goals of development will depend on the policies pursued by the developed and developing countries, domestically and internationally.

New industrial planning techniques: macro, sectoral and project linkages*

*Arie Kuyvenhoven***

Interindustry, or input-output, analysis is increasingly being applied as an important technique used in many developing countries in both industrial and economy-wide planning. As a result, a variety of models meant for sectoral planning have been developed in which intersectoral linkages based on input-output relations figure prominently. In this article a special case of Leontief's traditional input-output techniques will be presented, namely, Tinbergen's semi-input-output method. Particularly suitable for planning purposes in developing countries with open economies, the method emphasizes the role of a country's comparative advantages in investment decisions. The method is typically relevant for *ex ante* resource allocation decisions concerning the creation of new capacity and can be appropriately applied in both sectoral and project planning.

The special character of the semi-input-output method derives from the distinction between international and national sectors, a distinction based on the mobility of commodities produced, and similar to I. M. D. Little's distinction between tradable and non-tradable goods. Whereas in traditional input-output analysis the calculation of indirect effects is based on existing intersectoral linkages, the semi-input-output method confines indirect production effects to those sectors where they necessarily occur, namely, between the national sectors. In these sectors non-tradable goods are to be produced domestically because no alternative source of supply is available. By contrast, demand for international goods can in principle be met from international trade, and input-output relations between international sectors are therefore not considered relevant for production and investment decisions. It can be argued that indirect effects of capacity expansion in international activities should not include assumed capacity efforts on other international sectors, the desirability of which is subject to separate investment decisions.

Before the semi-input-output method is presented, current planning methods and procedures in developing countries and selected planning techniques for sectors and projects are reviewed. The distinction between and interaction of different stages in development planning is discussed and some related organizational issues are raised. Then sectoral and project planning is treated in more detail, and an attempt is made to indicate how possible inconsistencies between the sector and the project stages in the allocation of resources can be removed. The semi-input-output method itself is presented next. Its basic concepts are discussed and the planning implications compared with other approaches such as Nurkse's and Hirschman's. Applications of the method at the sectoral level are discussed, in particular the estimation of indirect effects and the use of linkage criteria. The major differences with Leontief's input-output model are numerically illustrated. Applications at the project stage are then given. Special attention is paid to the estimation of accounting prices for

*This article is partly based on the author's *Planning with the Semi-Input-Output Method* (Leiden, Martinus Mÿhoff Social Sciences Division, 1978) to which the reader is referred for a more detailed presentation of the method.

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national, non-tradable goods, and the similarity with the Little-Mirrlees method of shadow pricing is shown. The study concludes with the use of direct *versus* bunch selection criteria in project appraisal.

Planning in the developing countries

Development planning can be defined as the preparation and co-ordination of medium- and long-term economic policy by those government institutions involved in formulating, implementing or executing development policy. Policy is supposed to include the formulation of development objectives as well as the selection of instruments of development policy that government institutions are able and willing to apply. The choice of both targets and instruments will reflect, of course, value judgements made by policy makers. Because in most developing countries the outcome of the development process is not exclusively left to the market, development planning is, in one way or another, applied by a host of countries adhering to widely differing economic systems.

As development planning normally deals with a variety of socio-economic problems involving a fair number of government institutions, economy-wide development planning can be a complicated matter. It relates to a number of fundamental and very different questions affecting both the public and private sector of the economy such as:

(a) The desired rate of growth of production and investment; the distribution of income among income groups and regions; the development of employment opportunities, in particular for unskilled workers; the identification of major bottle-necks such as the rate of saving; the availability of skilled labour, management and administrative capacity; the maximum balance-of-payments deficit, or the provision of education and training opportunities;

(b) The desired economic structure by sector and region, i.e., which industries should be developed or expanded, by how much, and in which region; a directly related problem is, for example, the sectoral distribution of investment in infrastructure;

(c) The selection and location of investment projects and the choice of production technique, in particular, the degree of labour intensity;

(d) The time-horizon to be chosen, affecting, among other things, the treatment of saving; for very long planning horizons the determination of the optimal rate of saving is a fundamental problem to be solved; in the medium term, saving is often considered a given constraint on the development of national income.

Many of these questions are interrelated: the choice of a certain production technique has consequences for the distribution of income, employment creation and the rate of saving. The sectoral distribution of investment affects the rate of growth of production, which, in turn, partly depends on the rate of saving and the development of the balance of payments, but also on the number of projects eventually selected and implemented. The latter again depends on the administrative capacity to identify projects and the technical and managerial skill to execute them properly.

The complicated nature of development planning has led to different approaches towards the kind of models to be designed for planning economic development. One

approach is to accept fully the interdependence of various problems and to use detailed, highly complex mathematical models to solve all problems simultaneously. Other approaches, while acknowledging interdependencies, have concentrated on ways of simplifying the complex questions in development planning by breaking them down into separate though not independent problems. In this context, Tinbergen [1] has proposed that several consecutive stages in development planning characterized by different degrees of aggregation, be distinguished, namely:

(a) A macro stage, in which the development of the main economic and financial aggregates is determined;

(b) A middle stage, in which the expansion of different industries and their regional distribution is considered; if the regional aspect is treated separately, this stage can be called the sectoral stage;

(c) A project stage, in which investment projects are selected and their location is determined.

Depending on the way the planning process is organized, results for a particular stage should be carefully checked against those of other stages. With top-down planning, the results of some of the preceding stages may have to be reconsidered in the light of the findings for later stages. As information is usually much more precise at the micro stages of planning, ample opportunities for feedback into the more aggregate stages will have to be allowed for. Through iteration and reiteration the formulation of a plan can then gradually be improved.[1]

The need to allow for interaction between stages of planning can be illustrated by some of the problems caused by the different level of aggregation assumed for each stage. The successful execution of a plan, for example, depends, among other things, on the number of projects undertaken. Indeed, sectoral targets and some macroeconomic goals can be achieved only through the execution of new projects; many planners are therefore tempted to believe that what matters in development planning are the decisions at the micro level. The remainder of the plan is then viewed as the combined result of those decisions and considered merely a matter of aggregation. Without further qualification, this view exaggerates the role of the project stage. The analysis of projects itself requires information that can be obtained only at the macro level, and some goals can be achieved without explicit reference to the execution of projects. The view does emphasize, however, that in the process of aggregation so much information can be lost that results at the project level are not in accordance with those at the sectoral level. Similar contradictions can be observed when the results of detailed sectoral analysis are compared with the outcome of a less specific multisectoral model (necessarily) based on more uniform characteristics of various sectors. In both cases it is understandable that project and sectoral specialists remain suspicious about the results obtained by planners working at a higher level of aggregation.

Apart from the variety and interdependency of problems encountered in development planning, organizational matters play an important role in distinguishing planning stages as well. In most developing countries, planning is far from consistent and co-ordinated. As a rule, several departments or ministries are involved in preparing and implementing economic policy, but these different bodies do not necessarily share the same views on the future development of the economy

[1] Little and Mirrlees [2], chap. 6, give a vivid description of the interaction between aggregate plans and projects. See also UNIDO [3], chaps. 1 and 11.

or on its development priorities. Hence, in the absence of a powerful central planning office or a consensus on the aims of development, the investment plans of different departments are often inconsistent. Moreover, not all sectoral interests are equally well represented in the various departments (notably agriculture), so that aggregating the different investment plans may well result in a rather unbalanced development of the national economy.

Breaking down planning into different stages generally enables institutions dealing with special planning problems to be identified with a particular stage of planning, which may facilitate the co-ordination and execution of development policy of the various institutions involved. In addition, the recognition of different levels of decision making may help departments to understand that they are not operating in isolation and that no information should be withheld that might affect decisions of other departments.

In reality, the rationality and consistency of development policies of various government institutions have often been questioned and considered too extreme. Moreover, planners may differ in their view of what Sen [4] has called the different control areas within the government machinery, and, hence, may differ on whether certain policies can actually be implemented. Obviously, such questions can be answered only in a particular case, and planners may therefore have different opinions about the extent to which interdependent questions at different levels of planning can be solved and organized separately and the outcome at different stages be made consistent through feedback of information.

An interesting case of such an interdependency is the relation between sub-optimal savings (at the macro stage) and the choice of projects and techniques (at the project stage). Generally, the occurrence of sub-optimal savings alone is not a sufficient reason to incorporate this factor into project selection criteria. It remains to be shown that additional savings cannot be sufficiently generated other than through the choice of projects (techniques), and if so, that different projects (techniques) contribute in different proportions to the macroeconomic balance between consumption and saving. A similar interdependency arises in connection with determining the accounting price of tradable goods and the question to what extent project appraisal and project implementation with respect to trade measures can be separated. As a rule, special trade measures or subsidies may be considered part of the implementation of a project, distinct from project evaluation, including the determination of accounting prices.

Planning for sectors and projects

In practice, the relevance of distinguishing several stages in planning will depend on factors such as the size of the country, the location of economic activities, international trading opportunities, natural endowment, special skills, economic system and institutions, and characteristics of projects to be developed. Thus, in a small, homogeneous country there may be no need for a middle stage, and planning may be confined to the macro and project stages. In contrast, countries with a large, spatially dispersed market may find it useful to work with all stages of planning to keep matters comprehensible. Similarly, if sectors are fairly homogeneous, planning at the sectoral and project levels may largely coincide; if not, as is often the case in agriculture and manufacturing, sectoral priorities and policies are typically prepared

at a more aggregate (sectoral) level, whereas most investment decisions are taken at the micro level. Both examples, incidentally, point to a major dichotomy in the planning process, namely, the basic difference between the project stage and other stages of planning. If a project is defined as the smallest technically independent unit of production, the other stages are characterized by different degrees of aggregation of the very units that are the subject matter of microeconomic analysis at the project stage.

At each stage of the planning process, special techniques are employed to analyse the problems of that stage. At the sectoral stage, in which the main problem is to determine which industries should be developed or expanded, and to what extent, interindustry analysis is widely recognized as a powerful analytical planning technique. Over the years, a variety of economy-wide multisectoral models have been developed in which input-output relations usually play an important role. Increasing experience with such models has led to a growing similarity in their general framework, enabling routine applications on a fairly large scale (see Taylor [5], Clark [6]). Without such models, it seems hardly possible to estimate changes in the composition of demand, in the sectoral distribution of production and investment, and in a country's trade pattern consistently, i.e., avoiding shortages in some sectors and surpluses in others. Moreover, requirements of intersectoral consistency in the presence of non-substitutability between sectors often put additional constraints on the rate of growth of an economy, causing an upward bias in estimates obtained with more aggregative methods. Finally, the use of an input-output framework offers a useful basis for discussion between project or sectoral specialists and those concerned with macroeconomic analysis and planning (Taylor [5], p. 42).

At the same time, however, there is a growing awareness of the limitations of the results of empirical applications to developing countries, both with regard to the sectoral level itself as well as other levels of planning. Stability of the structural coefficients poses a first problem. Input-output, capital-output and labour coefficients are normally estimated on the basis of data from some recent period. The inevitable time-lag between the last period of observation and the period to which the planning exercise refers becomes a major cause for concern in those countries where more than marginal additions to existing industries and rapid changes in technology may very well affect the stability of input coefficients.

A second major problem concerns the homogeneity of the sectors distinguished and is closely related to the aggregation problem. Theoretically, the basis for aggregating commodities is either similarity in input structure or output proportionality. When thousands of commodities are aggregated into a limited number of sectors, it is an empirical matter whether those requirements are reasonably met. Several empirical studies suggest, however, that at the usual level of aggregation in input-output analysis, heterogeneity of sectors may be such that the variance in economic characteristics among commodities within the same sector is larger than among sectors themselves.

Another set of problems arises when multisectoral models are specified as linear programming models. Following Taylor ([5], p. 59), the structure of applied planning models of this kind can usually be characterized by three kinds of restrictions. First, there are the real limitations on economic growth posed by input-output imbalance and the lack of primary factors of production and foreign exchange. A second type of constraint is meant to reflect important but not well-understood limitations on growth, which are partly non-economic (absorptive capacity constraints, minimum

consumption and employment requirements, protection etc.). Third, *ad hoc* restrictions are included to avoid overspecialization in foreign trade and other forms of extreme behaviour implied by linear systems. Given the nature of the restrictions of the second and third type, the usefulness of such planning models lies primarily in their indication of broad areas of sectoral choice rather than in exact optimal solutions for the development of sectors.

Similar qualifications apply to the dual solution. As a result of model specification, small changes in the primal may cause large and discontinuous changes in the dual. The dual of an optimizing model of this kind should therefore primarily be used to check the structure of the model and the nature of the primal solution. Any additional claim that the dual can be used to determine accounting prices for project appraisal seems too ambitious at present (see Bruno [7], Manne [8]).

Given these criticisms, the question obviously arises about the role economy-wide multisectoral models can actually play in planning. Before answering this question it should be emphasized that the relevance of the first two criticisms, relating to stability and homogeneity, can be judged only in a specific case, whereas the other objections point to theoretical limitations that are bound to influence the results in any case. If, for whatever reason, the first two objections are ignored, one arrives at a view regarding the minimal role of multisectoral models, of which the position of Little and Mirrlees [2] is a good example. In their opinion, the planning process is characterized by the interaction of macroeconomic planning based on aggregate analysis and microeconomic planning at the sectoral (if there exists economies of scale) and project level using partial analysis. With more and better information coming from individual projects, tentative estimates of the development of economic aggregates can be improved, which, in turn, should permit improvement in project analysis and appraisal.

While correctly emphasizing the importance of project analysis in planning, this position clearly underestimates the organizational and analytical difficulties of arriving at an optimum or even consistent plan on the basis of project data and partial analysis alone. Traditional input-output techniques, for example, provide for intersectoral consistency, enable the derivation of an implicit price system, and can be a starting point for linking macro and micro results. Disaggregation of heterogeneous sectors and updating or replacing original input data may successfully remedy some of the empirical shortcomings of applying input-output techniques in developing countries.

In the project stage of planning, investment projects are identified, prepared and appraised; hence, project planning can be considered the most concrete stage of planning. The degree of detail and quality of the data usually enable a much more precise analysis to be made than is possible at the previous stages of planning. Thus, the appraisal of projects can be based on criteria that reflect the objectives of development policy, all relevant scarce factors, and take account of particular conditions of application. When the number of projects appraised in this way takes up a significant part of the investible resources, systematic project planning has two important implications for the sectoral stage: *(a)* it leads to a substantial improvement in the available information on sectoral coefficients and, hence, in the estimation of effects, in particular, indirect or linkage effects; *(b)* it enables sectoral criteria of attractiveness, either based on partial analysis or derived from economy-wide multisectoral models, to be refined. As a result, the consistency

between the outcome of planning exercises at the sectoral and project levels can be improved.

Once accepted and implemented, a project increases the supply of outputs by using a specific combination of inputs that could have been used elsewhere in the economy. Without the project, the demand for inputs and the supply of outputs would have been different in the rest of the economy. By comparing the differences between a situation with and without the project, the benefits and costs associated with the project can in principle be identified, on the basis of which it can be decided whether the proposed use of resources is justified or not. Two steps can usually be distinguished in this procedure: *(a)* estimating the changes in the economy caused by a particular project (the effects of the project); and *(b)* considering what these changes are worth (to the investor, the government, social groups) by comparing them with alternative changes that would have occurred in the rest of the economy without the proposed project.

By definition, direct effects of a project refer to the physical inputs and outputs of the project and follow as a rule from the project's technical characteristics. Other important consequences of a project for the rest of the economy include the necessary domestic adjustments on the supply side (indirect or linkage effects), effects that represent a benefit or cost for the society but not necessarily for the project (external effects), price effects and distributional effects.

Generally, the valuation of relevant project effects is not an unambiguous matter but depends on the objectives and constraints of decision makers and social groups concerned. For a profit-maximizing private investor, the actual or expected receipts and expenditures resulting from a project are the relevant benefits and costs, implying the valuation of project effects at actual or expected market prices. For national planning purposes, however, the valuation of project effects should reflect the ultimate contribution to or detraction from the society's objectives. In developing countries, market prices can usually not be expected to reflect true or real project costs and benefits to society, because they often result from highly distorted markets in which society's objectives are at best only partly reflected. Instead, a set of accounting prices normally has to be estimated, indicating the real costs of inputs and the real benefits or outputs to society, including, when necessary, the distributional aspects mentioned above.

In this connection, it is sometimes argued that the introduction of other than direct effects in the appraisal and selection of projects can be taken as a substitute for the use of factor accounting prices. This position, as shown by Balassa [9] for the case of the "effects" method of Prou and Chervel, appears incorrect. If markets are perfectly competitive, all factors of production are fully utilized, project changes are marginal and not subject to increasing returns, no external effects occur, and the government is indifferent as to whom project income accrues and how it is spent, actual project receipts and expenditures can be expected to measure the true benefits and costs to society. Under these assumptions, the project's direct net benefits (profits) as measured through market prices are a correct indication of the gain to society, and any indirect effects need not be considered because they are reflected in the prevailing market prices. If markets for commodities and factors are seriously distorted, market prices cannot be considered a good indicator of a project's gain to society and will fail to reflect the full consequences of a project. Such prices do not represent equilibrium prices ruling in a distortion-free economy, but relate to a situation in which distortions are likely to persist.

The calculation of project effects is independent of the use of accounting prices. The latter partly depend on value judgements of the government as well as resource and policy constraints that may be reflected in the calculation of other than direct effects. The inclusion of those effects in project appraisal can therefore not be taken as a substitute for using accounting prices. However, depending on the way accounting prices are actually estimated, it cannot be excluded that they substitute for some of the indirect and other effects.

A comparison of the methods of sectoral and project analysis described above shows that possible inconsistencies in the allocation of resources mainly arise from two sources: *(a)* the use of different sets of accounting prices, reflecting in part policy constraints and objectives judged to be relevant by policy makers; and *(b)* the different number of scarce resources distinguished. To reduce such inconsistencies as much as possible, the devices described below are recommended.

First, the same system for determining accounting prices should be applied as far as possible at the project and at the sectoral stages. To this effect, the price models that underlie recent methods of project appraisal[2] can serve as a suitable point of departure for determining accounting prices at the sectoral level. As a first approach, input-output flows and corresponding structural coefficients can then be revalued by expressing them in new units of measurement based on estimated accounting prices.

As for the second source of inconsistencies, the number of primary resources distinguished at the sectoral level is usually smaller than at the project level, where, in principle, all primary factors should be appropriately costed. As the non-distinguished primary factors are implicitly valued at a zero accounting price, the net benefits identified at the sectoral level may differ from those at the project level. When, for example, benefits at the sectoral level are defined as the contribution to national income, sectoral value added converted into accounting prices is the appropriate benefit. When, at the same time, a measure of social income (profit) is defined as the net benefit at the project level, inconsistencies are bound to arise. Because of data limitations at the sectoral level, such inconsistencies may well occur in reality. Depending mainly on the availability of data, several approaches to remove these inconsistencies can be followed.

Sectoral benefits can be reformulated as much as possible in terms of social income or social profit in the Little-Mirrlees or UNIDO sense instead of using sectoral value added. In this approach, accounting prices for primary factors derive in principle from a general-equilibrium framework (although the actual estimation procedure includes a number of shortcuts).

A more ambitious approach is to integrate project selection into the framework of a multisectoral planning model in which the valuation of commodities and primary factors is determined by the dual solution. Such an approach inevitably shares the earlier-mentioned limitations of economy-wide planning models, of which the aggregation problem and the interpretation of the dual solution with respect to primary factors as their appropriate accounting price for project appraisal seem particularly relevant. The same qualifications apply to the use of empirically determined dual prices from a programming model at the project level for investment planning. Given present theory and the quantity and quality of the data available, the

[2] OECD *Manual* [10] and Little and Mirrlees [2], Squire and van der Tak [11], or *Guidelines* [3] and *Practical Guide* [12].

most promising approach to minimizing inconsistencies in project and sectoral appraisal is likely to be to reformulate sectoral benefits in terms of social income or social profit and express structural coefficients in terms of common accounting prices.

The semi-input-output method

A particular method of development planning at the sectoral and project levels is the semi-input-output method. Introduced by Tinbergen in the early 1960s, the method attempts to solve the closely related problems of efficiency in production and international trade through the right choice of sectors and projects to be developed. Particularly suitable for developing countries with open economies, the method explicitly emphasizes the role of a country's comparative advantages in investment decisions. Through appropriate shadow pricing, the international competitiveness of new activities is brought into the planning process from the very beginning.

As the name suggests, the semi-input-output method can be considered a special case of W. Leontief's traditional input-output method. Its special character derives from the distinction between international and national sectors, a distinction based on the mobility or transportability of the commodities produced. The distinction derives from the assumption that for each good a spatial unit can be defined within which the good can be considered mobile because its transportation costs are negligible, and outside which it can be regarded as immobile because transportation costs would be prohibitive.

It follows that the tradability of a good can now be defined in relation to the largest spatial unit for which the good can still be regarded as mobile. Depending on the nature and size of the spatial units, goods may therefore be approximately classified as local, regional, national or international. Goods for which transportation costs never become prohibitive can be defined as international goods. For national economies, only international and national goods (including regional and local goods) need to be distinguished, a distinction which, in this special case, coincides with the one between tradable and non-tradable goods as introduced by I. M. D. Little.

In traditional input-output analysis, the calculation of indirect effects is based on existing intersectoral linkages. With the semi-input-output method, however, indirect effects are confined to those sectors where they unavoidably occur, namely, between the national sectors. Lacking any alternative source of supply, the production of national goods must be expanded in accordance with increased demand, which, to a large extent, is caused by expansion of production in the international sectors as will be shown below.

Changes in demand for international goods can in principle be balanced by international trade; and input-output relations between international sectors are therefore not considered relevant for production and investment decisions—for the simple reason that the mere presence of domestic demand for international products is not a sufficient condition for creating productive capacity (as it is in the case of national goods). The decision to expand an international sector should be based on a country's primary resources (determining its comparative advantages in international trade) and its development objectives. Indirect effects of such an expansion of capacity should not include assumed capacity effects on other international sectors,

the desirability of which is subject to separate investment decisions. Including these assumed capacity effects would imply that different investment decisions are mixed up.

Empirically, the relative importance of national sectors—including construction, utilities, housing, trade, transportation, personal and government services, education, health and business services—can be shown to be considerable. For selected countries of the European Economic Community, 55-65 per cent of value added and 47-54 per cent of output originate in the national sectors. For selected developing countries, the relative shares show a much wider variation, mainly depending on the importance of agriculture and mining: 33-64 per cent for value added and 34-54 per cent for output. Combining these results shows that the relative share of national activities apparently assumes a maximum value of about 65 per cent of aggregate income and 55 per cent of aggregate output. Substantially lower values obtain for countries with a high relative share of primary activities.

To illustrate the semi-input-output method and to facilitate a comparison with other methods of development planning, we start out from a simple input-output system in which N sectors are distinguished.[3] The corresponding balance equations can be written as

$$x_N = A_{NN}\, x_N + j_N + f_N + e_N \qquad (1)$$

where

x_N = vector of increases in output in N sectors during a planning period

j_N = vector of increases in sectoral deliveries of capital goods

e_N = vector of changes in sectoral exports minus imports

f_N = vector of increases in sectoral final demand other than for investment and export goods

A_{NN} = matrix of technical input-output coefficients, element α_{ij} $(i = j = 1, \ldots, N)$ denotes current input of good i per unit of output of sector j

Equation (1) shows that a particular commodity i can be used for intermediate purposes, i.e., for deliveries of inputs into current production of all sectors and for final purposes. Intermediate demand is determined by technical input-output coefficients α_{ij} and the change in the level of output of all productive sectors x_j. Thus, total intermediate demand for commodity i adds up to $\sum_{j=1}^{N} \alpha_{ij}\, x_j$ units. The increase in final demand other than for investment and export purposes is considered exogenous. As the sum of the changes in the different uses to which a commodity can be put equals the change in domestic and foreign supply, the trade variables e_i act as a balancing item once the changes in sectoral output x_j are known. When positive, they are used to meet foreign demand for commodity i; when negative, they represent additional foreign supply (imports) to supplement domestic supply.

Assuming that there is no general excess capacity at the beginning of the planning period, increases in output will require capacity expansion of which the corresponding increase in demand for various capital goods can be described as

$$j_N = h\, K_{NN}\, x_N - \bar{j}_{0N} \qquad (2)$$

[3] Readers unfamiliar with or wishing to review the notation of matrix algebra used in the equations to follow may wish to consult one of the many available textbooks on mathematical economics.

where

K_{NN} = matrix of partial capital-output ratios, element κ_{ij} $(i = j = 1, \ldots, N)$ denotes investment of good i per unit output of sector j

h = capital stock-flow conversion factor

$\bar{j}_{0N}$ = vector of the level of sectoral deliveries of investment goods from existing capacity at the beginning of the planning period

Investment equation (2) shows that a production expansion x_j will require different capital goods i as indicated by the partial capital-output ratios κ_{ij}. The total demand for capital good i will therefore amount to $\sum_{j=1}^{N} \kappa_{ij} x_j$, which will be met from existing capacity to the extent indicated by $\bar{j}_{0i}$ as well as from increments in capacity during the planning period enabling the supply of an additional amount j_i. The cumulated annual investment flows required for the increase in output during the planning period are related to the level of terminal year investment $\bar{j}_T = \bar{j}_0 + j$ through a uniform stock-flow conversion factor h.

Substituting equation (2) into equation (1) gives

$$x_N = H_{NN} x_N - \bar{j}_{0N} + f_N + e_N \tag{3}$$

where $H_{NN} = A_{NN} + h K_{NN}$, showing that deliveries on both current and capital account have been added in a single parameter $\eta_{ij} = \alpha_{ij} + h\kappa_{ij}$.

We now introduce the distinction between international and national sectors by splitting the N productive sectors into F international and D national sectors $(F + D = N)$. As a result, equations (1) and (2) can be reformulated by partitioning them into an international and a national part, enabling equation (3) to be rewritten as

$$x_F = H_{FF} x_F + H_{FD} x_D - \bar{j}_{0F} + f_F + e_F \tag{4}$$

and

$$x_D = H_{DF} x_F + H_{DD} x_D - \bar{j}_{0D} + f_D \tag{5}$$

Characteristically, no trade variables appear in the balance equations for the national sectors, and the general solution for the increases in output of the national sectors, including the complementary indirect production effects on the national sectors caused by planned production expansions x_F in the international sectors, can be found, using the technique of matrix inversion, by solving equation (5):

$$x_D = (I_{DD} - H_{DD})^{-1} (H_{DF} x_F - \bar{j}_{0D} + f_D) \tag{6}$$

Notice that in the national investment goods sectors (in which $\bar{j}_{0i} > 0$) total production effects exceed total capacity effects by $(I_{DD} - H_{DD})^{-1} \bar{j}_{0D}$) units.[4]

For a particular capacity expansion x_e in international sector e, the capacity effect on the national sectors will be defined as the marginal increase in capacity $x_{D,e}$ complementary to the planned increase in capacity x_e. It follows then directly from equation (6) that

$$x_{D,e} = (I_{DD} - H_{DD})^{-1} \eta_{D,e} x_e \tag{7}$$

where $\eta_{D,e}$ is the e-th column of sub-matrix H_{DF} of national inputs into international sectors. As there is no alternative source of supply for the national

[4] Equation (6) corresponds to a general matrix equation $\bar{x} = (I-A)^{-1} d$, where I is an identity matrix and $(I-A)^{-1}$ is an inverse.

sectors, any capacity expansion in an international sector entails a number of complementary production effects on the D national sectors, caused by the demand for national (current and capital) inputs $\eta_{D,e}$ into international sector e. In the usual input-output fashion, the latter are augmented by indirect production effects caused by interdependencies among the national sectors as shown by the inverse $(I_{DD} - H_{DD})^{-1}$. For the calculation of the cumulative production effects, only the national part of the relevant input-output matrix is thus used, hence the name semi-input-output method.

In principle, no indirect production effects comparable to those in the national sectors occur in the international sectors because their interdependencies in production are broken by the possibility of international trade. As shown in equation (4), any effect of a planned capacity expansion in an international sector (directly through the sub-matrix H_{FF} or indirectly through the effects on the national part of the economy as indicated by sub-matrix H_{FD}) on the demand for other international goods can be met through either increased production or imports. Owing to the tradability of international goods, expansion of capacity in one international sector can therefore be considered independently of the others. At the same time, however, no capacity expansion in an international sector can be considered in isolation because of its complementary effects on the national sectors. As shown by vector $\eta_{D,e}$, the latter are generally specific to each international sector and, together with the international capacity expansion, make up what can be called a bunch of complementary activities.

Turning to the planning implications of the semi-input-output method, the model presented above, though highly simplified, serves to illustrate two important implications of the method. First, lacking any alternative source of supply, the production of the national sectors must be expanded in accordance with increased demand, which is, to a large extent, caused by capacity expansion in international sectors. Hence, planning of national sectors should be based on demand forecasts and cost effectiveness if alternative techniques are available. Secondly, input-output relations between international sectors are not considered relevant for production decisions as long as additional demand for international products can be met from imports. Under a system of perfect foreign trade, the decision to expand an international sector should be based on considerations with regard to a country's primary resources and development goals as reflected in the corresponding bunches of activities. With the possibility of international trade, the mere presence of domestic demand for international products can never be a justification for creating productive capacity, as it is in the case of national goods.

One of the implications of the method just mentioned, namely, that the expansion of production of the national sectors should be in proportion to the expansion of demand for their products, corresponds exactly with Nurkse's concept of balanced growth. Hence, as far as the national sectors are concerned, Nurkse's concept of balanced growth harmonizes with that of the semi-input-output method.

The implication that international sectors can expand independently of the presence of linkages between them contrasts sharply with Hirschman's model of economic development. In Hirschman's view, the scarcest resource in developing countries is decision-making ability, in particular with regard to investment. The appropriate strategy to be followed in this case would be to induce such decisions through a set of mechanisms, of which Hirschman emphasizes two. First, the establishment of an activity that requires substantial amounts of fabricated

intermediate inputs is assumed to induce investment opportunities in the sectors producing these inputs. Because of the growing demand for these inputs, the expansion of domestic production is expected to be encouraged in order to supply the additional inputs. Hirschman calls this effect the backward linkage effect; it can be measured by the ratio of purchased intermediate inputs to the total cost of production. Secondly, the output of the newly established activity is believed to induce production expansions in those sectors that use the outputs as inputs in other new activities. This is the forward linkage effect, measured by the ratio of intermediate deliveries to total demand. Both effects measure direct production effects only; the total linkage effect, including all indirect effects, can be measured by the traditional Leontief inverse.

The potential linkage generation of the different sectors can now be used to rank sectors in order of priority. In terms of development strategy, highest priority is assigned to those sectors having both high backward and high forward linkages. In Hirschman's view, concentrating on these sectors will deliberately cause some imbalance in the economy, which serves to underline the investment opportunities for businessmen. In this way, potential savings may be mobilized and channelled into investment; decision-making ability will develop in a learning process; and growth will be stimulated by breaking bottle-necks created by supply shortages ("unbalanced growth").

A comparison of Hirschman's concept of sectoral linkages with that implied by the semi-input-output method, namely, the complementary bunches of activities, shows several major differences. For new activities the sectoral linkages as defined by Hirschman suggest potential investment opportunities based on the technical characteristics of the production processes. However, to the extent that goods can only be supplied domestically, as in the case of national products, the production effects on the national sectors are unavoidable, a phenomenon clearly recognized by the semi-input-output method. In view of the continuous difficulties in keeping the supply of national goods in line with demand in most developing countries (construction, electricity, water, transport, education), the necessary investment to increase productive capacity in those sectors should be planned well in advance in order to balance supply and demand.

On the other hand, the potential production effects on the international sectors, indicating possible investment opportunities, can be misleading with respect to the efficient allocation of resources. If a country lacks certain resources, it can be efficient to avoid a number of backward linkages and to import the technically necessary inputs instead (though the actual tariff structure may encourage domestic production so that private and social profitability may conflict). In addition, if domestic demand increases, not only production expansion in an international sector should be considered but the possibility of exporting goods should also be taken into account. Hence, a country's comparative advantage in foreign trade based on the corresponding complementary bunches of activities, not the input-output linkages between international sectors, should determine their expansion.

Applications at the sectoral stage

The significance of the semi-input-output method for planning purposes, both at the sectoral and project stages, lies in its ability to permit a systematic treatment of efficiency in production and international trade. As explained in the preceding

section, the method emphasizes that *(a)* the real choice in development is among international activities and *(b)* each investment project in an international sector can only be considered in combination with complementary investment in the national sectors. The determination of the composition of complementary bunches of investment connected with a capacity expansion in an international sector can thus be considered one of the major contributions of the semi-input-output method at the sectoral level of planning. Once the exact composition of the complementary bunches is known, its significance is twofold: *(a)* the (bunch) effects of a sectoral capacity expansion can be properly determined; *(b)* the attractiveness of sectoral capacity expansion can be established by valuing benefit and cost items among the (bunch) effects, enabling the identification and selection of sectors to be expanded.

As a planning method, semi-input-output is thus primarily concerned with the choice of sectors to be developed or expanded and the selection of projects on the basis of a country's comparative advantage, i.e., by specializing in those activities in which a country is able to compete in the world market through exports and import substitutes. For a given selection criterion, the semi-input-output method can thus be considered a special way of optimal investment allocation. At the sectoral level the method enables international sectors to be ranked according to a criterion of attractiveness. It should be emphasized, however, that it does not solve the question of the desired level of expansion of the international sectors. Unless the sectoral increases in capacity are completely built up from individual projects, or complete specialization at the sectoral level occurs, the problem of sectoral expansion still remains to be solved. Extending the method into a more comprehensive one enabling an explanation of changes in capacity in the international sectors themselves inevitably results in the construction of conventional input-output or programming models.

Although the inability to determine changes in the sectoral composition of production is a clear limitation of the semi-input-output method, the determination of sectoral capacity expansion is in fact one of the most demanding planning exercises for which, at the level of disaggregation usually required, no single technique can be said to give a satisfactory answer. Because semi-input-output is less comprehensive than economy-wide models and relatively simple to apply, the method can be used at a high level of disaggregation enabling the identification and appraisal of many industries at the three- or four-digit level in which a country might have a comparative advantage.

To explain the estimation of complementary effects, a numerical example will be presented in which the direct and indirect effects according to semi-input-output and traditional input-output analysis are calculated. The various effects of a unit capacity expansion in sector j will be denoted by a general symbol β_j. The direct effect of a unit capacity expansion x_e in international sector e on investment, employment, value added, profits etc. is then given by β_e. With the semi-input-output method, the indirect production effects $x_{D,e}$ are confined to the national sectors and the total effect of a complementary bunch of activities can be written as (see equation (7))

$$\tilde{\beta}_e = \beta_e + \beta'_D \, (I_{DD} - H_{DD})^{-1} \, \eta_{D,e} = \beta_e + \beta'_D \, \bar{\eta}_{D,e} \tag{8}$$

where, in addition to the symbols defined, β'_D is a row vector and vector $\bar{\eta}_{D,e}$ expresses the cumulative capacity effect on the national sectors. Henceforth, $\tilde{\beta}_e$ will be called the bunch effect.

In traditional input-output analysis, indirect effects occur in all productive sectors, and the comparable total effect of a unit increase in final demand for a good produced by sector e amounts to

$$\bar{\beta}_e = \beta'_N (I_{NN} - H_{NN})^{-1} \iota_{N,e} \tag{9}$$

where vector $\iota_{N,e}$ is a unit vector with the e-th element equal to unity.[5] Because it includes the effects of all sectors, $\bar{\beta}_e$ will henceforth be called the total effect.[6]

When matrix H_{NN} includes imports, the effects $\bar{\beta}_e$ are obviously maximum estimates because they include the additional production effects of previously imported commodities. One way to correct for this is to fix the relation between domestically produced and imported commodities and to subtract competitive imports from sub-matrix H_{FN} (it is assumed that non-competitive imports are already excluded). The lower estimates $\bar{\beta}^d_e$ now refer to a situation in which the domestic input structure of production remains unchanged during the planning period.

A careful comparison of equations (8) and (9) shows how semi-input-output emerges as a special case of traditional input-output analysis when the assumption is made that all imports and domestic production of international sectors are perfect substitutes, so that the entire sub-matrix H_{FN} vanishes. For this assumption, the solution of the inverse in equation (9) becomes a special case of the general method of inverting a matrix by partitioning, namely,

$$\left[\begin{array}{c|c} I_{FF} & 0 \\ \hline -H_{DF} & I_{DD}-H_{DD} \end{array}\right]^{-1} = \left[\begin{array}{c|c} I_{FF} & 0 \\ \hline (I_{DD}-H_{DD})^{-1} H_{DF} & (I_{DD}-H_{DD})^{-1} \end{array}\right]$$

Applying this special case of matrix inversion to equation (9) gives equation (8).

In the numerical example, four productive sectors are distinguished: sectors 1 and 2 produce international and sectors 3 and 4 national goods. Capital goods originate in sectors 2 and 4. No complementary imports are distinguished. Value added consists of wage income and profits. The matrices of technical input-output coefficients A_{NN} and of partial capital-output ratios K_{NN}, and the vectors of value added coefficients α_{0N}, of profit-output ratios ξ_N, and of capital-output ratios κ_N are given as

$$A_{NN} = \left[\begin{array}{cc|cc} 0.1 & 0.3 & 0.1 & 0.3 \\ & (0.1) & & (0.1) \\ 0.1 & 0.2 & 0.1 & 0 \\ (0.1) & (0.1) & (0.1) & \\ \hline 0 & 0.2 & 0.2 & 0.1 \\ 0.2 & 0 & 0 & 0.2 \end{array}\right]$$

[5] With the semi-input-output method, a unit increase in final demand f_e is, by assumption, identical to a unit capacity expansion x_e in international sector e.

[6] For a "well-behaved" matrix H_{NN}, the inverse in equation (9) can be written as an expansion in powers according to

$$(I_{NN} - H_{NN})^{-1} = I_{NN} + H^2_{NN} + \ldots = I_{NN} + H^s_{NN}$$

enabling the direct and indirect effects to be written separately as

$$\bar{\beta}_e = \beta_e + \beta'_N \eta^s_{N,e}$$

where vector $\eta^s_{N,e}$ is the e-th column of matrix H^s_{NN}.

$$K_{NN} = \left[\begin{array}{cc:cc} 0 & 0 & 0 & 0 \\ 1.2 & 0.4 & 1.0 & 0.4 \\ (0.8) & (0.4) & (0.8) & (0.4) \\ \hdashline 0 & 0 & 0 & 0 \\ 0.6 & 0.2 & 2.0 & 0 \end{array}\right]$$

$$\alpha'_{0N} = \left[\begin{array}{cc:cc} 0.6 & 0.3 & 0.6 & 0.4 \end{array}\right]$$

$$\xi'_{0N} = \left[\begin{array}{cc:cc} 0.3 & 0.2 & 0.4 & 0.1 \end{array}\right]$$

$$\kappa'_{N} = \left[\begin{array}{cc:cc} 1.8 & 0.6 & 3.0 & 0.4 \end{array}\right]$$

Figures between brackets indicate assumed imports. The value of the capital stock-flow conversion factor h is put at 0.15. For the sake of convenience, coefficients are assumed to have been estimated from input-output flows measured in actual market prices. Hence, the sectoral value added coefficients are defined as $\alpha'_{0N} = u'_N (I_{NN} - A_{NN})$ and the sectoral capital-output ratios as $\kappa'_N = u'_N K_{NN}$, where u'_N is a sum vector.

Estimates of direct and indirect effects according to equations (8) and (9) for investment, value added and profits are presented in table 1.

Table 1. Direct and indirect effects of a unit capacity expansion in international sector *e* according to semi-input-output and traditional input-output analysis

Effect on	*Sector expanded*	*Direct effect* (β_e)	*Semi-input-output* ($\bar{\beta}_e$)	*Traditional input-output*	
				($\bar{\beta}^d_e$)	($\bar{\beta}_e$)
Investment (κ_e)	1	1.8	2.095	2.738	4.587
	2	0.6	1.457	2.413	4.729
Value added (α_{0e})	1	0.6	0.781	1.018	1.688
	2	0.3	0.515	0.868	1.709
Profits (ξ_e)	1	0.3	0.357	0.473	0.838
	2	0.2	0.321	0.494	0.946
Value added/investment criterion (α_{0e}/κ_e)	1	0.333	0.373	0.372	0.368
	2	0.500	0.354	0.360	0.361
Profits/investment criterion (ξ_e/κ_e)	1	0.167	0.170	0.173	0.183
	2	0.333	0.220	0.205	0.200

The difference in the size of the indirect effects between semi-input-output and traditional input-output analysis is clearly brought about in the last three columns of table 1, and follows, of course, from the assumed difference in the structure of interindustry linkages. With the semi-input-output method, production effects of increased demand for international goods are, by assumption, excluded, and indirect effects are invariably smaller than in the case of traditional input-output analysis. When total effects are calculated on the assumption that all import linkages have vanished, a further increase in the size of the indirect effects occurs as shown in the last column of table 1.

For the calculation of indirect effects, the major difference in approach between Leontief's traditional input-output analysis and Tinbergen's semi-input-output method therefore lies in the different treatment of internationally traded intermediate (and capital) inputs. In an open economy with foreign trade in intermediate inputs, the production effects of the usual input-output type will depend on the extent to which intermediate goods are produced domestically. If all intermediate inputs are imported, no production effects on other sectors occur and the inverted Leontief matrix simply becomes a unit matrix. If, on the other hand, all intermediate goods are produced domestically, maximum production effects on all sectors of the economy that are technologically linked with one another occur, as measured by the Leontief inverse based on technical input-output coefficients. If, in an open developing economy with a limited industrial base and a variety of imported intermediate products, new productive activities are established, the use of traditional input-output techniques to estimate expected domestic production effects is of dubious value.

The problem of estimating direct and indirect production effects becomes even more complicated if resource allocation considerations deriving from the theory of comparative advantage are introduced. These considerations will indicate the desirability of specialization in the production of a certain number of intermediate products and they dictate against the development of domestic production of other products that can be supplied better from abroad because of their unfavourable factor proportions at the prevailing relative scarcities. It is exactly the recognition "that there is never a technical necessity to combine one international-industry project with another"[7] that makes the semi-input-output method differ from traditional input-output analysis.

Once the complementary effects of a capacity expansion in an international sector are established and valued, sectors can be ranked by their attractiveness according to a given criterion. Such criteria can be derived by formulating the semi-input-output method as a programming model. Depending on the choice of the objective function and the specified constraints, the various selection criteria follow from the dual solution.[8] As the numerical example shows, changes in value of the direct criterion on the one hand and of the bunch and total criteria on the other result in a reversal in the ranking of the international sectors.

The estimation of bunch effects is considerably affected by trade imperfections and distortions. Because the latter imply restrictions on export and import demand, but not on domestic demand, the behaviour of such a "domestically producing" international sector may become identical with that of a national sector, and the corresponding balance equation can be transferred from equation (4) to equation (5). Thus, the complementary bunches of investment will change in size and composition when trade restrictions become binding. As a result, the attractiveness of sectoral capacity expansion is affected, and changes in the ranking of the international sectors according to a criterion of attractiveness may occur. In particular, the attractiveness of those international sectors having strong linkages with the "domestically producing" international sector can be expected to change because production expansion in those sectors will induce domestic demand for the products of the export-restricted sector. The extent to which significant rank reversals are likely to

[7] Tinbergen [13], p. 121.

[8] One of the criteria so derived can be shown to reflect the well-known domestic resource cost criterion.

occur in reality remains an empirical matter; a full assessment of the importance of trade limitations in the context of semi-input-output analysis cannot be made without reference to empirical results.

Applications at the project stage

Whereas at the sectoral level the choice of sectors to be developed and the volume of sectoral expansion are equally important, other questions arise at the project stage. For many projects, size is often dictated by technical and market conditions; when the question of project size arises, few alternatives exist. Except for those cases where economies of scale play an important role, project appraisal usually refers to different projects of a given size or to project alternatives of the same size when technical choice is considered. For a given selection criterion, projects or project alternatives are either accepted or rejected. As the cut-off rate for accepting a project is not always easy to determine, projects are sometimes ranked according to a criterion of attractiveness. The proper estimation of project effects, their valuation as benefits and costs, and the final selection of projects can therefore be considered the main elements of project planning.

Generally, project effects can be identified by comparing estimated changes in the economy caused by a particular project with alternative changes that would have occurred without the proposed project. As explained in the preceding sections, among such effects are the direct effects—the physical inputs and outputs—and indirect effects—the necessary capacity adjustments on the supply side in those vertically related stages of production for which no alternative source of supply exists, i.e., the national industries—together making up the bunch effects of a project.

Because a project can be considered the smallest technically independent unit of production, the identification of effects of capacity expansion at the project stage differs from that at the sectoral stage in several respects. At the project level, the lifetime of capacity expansion is explicitly taken into account. Partly related to it is the explicit distinction between the investment or construction period and the operation period, implying the calculation of two kinds of project effects: one referring to investment activities and the other to operating or current activities. In many cases, first-order and sometimes higher-order capital inputs, current inputs and outputs are project-specific, and can therefore be properly identified only at the micro level. Direct substitution through the choice of techniques can be realized only through the implementation of new projects. The project stage is therefore particularly suited for the identification of alternative techniques.

Under a number of simplifying assumptions, the composition of complementary bunches for project effects can be derived in a way similar to that at sectoral level. There are, however, some interesting differences. At the project level, the explicit distinction between the construction and operation periods implies a corresponding distinction between the complementary indirect effects. This distinction is especially relevant with respect to the length of the operation period. The definition of direct capital and current input requirements as project-specific permits a distinction between international sectors and commodities as well as the identification of different techniques to produce a specific good.

Apart from the identification of project effects, the semi-input-output method has particular relevance for the valuation of effects, notably the estimation of

accounting prices for national, non-tradable products. Assuming that *(a)* sufficient input-output data expressed in terms of producer's prices are available and *(b)* international goods are valued at the domestic currency equivalent of their border value to reflect world market conditions, the following simple price model for determining accounting prices for national goods can be formulated:

$$p'_F = u'_F (I_{FF} + \hat{\tau}_F)^{-1} \tag{10}$$

$$p'_F = p'_F A^*_{FF} + p'_D A^*_{DF} + \lambda w'_F + (p'_F K^*_{FF} + p'_D K^*_{DF}) \hat{\rho}_F \tag{11}$$

$$p'_D = p'_F A^*_{FD} + p'_D A^*_{DD} + \lambda w'_D + (p'_F K^*_{FD} + p'_D K^*_{DD}) \hat{\rho}_D \tag{12}$$

where, in addition to the symbols defined,

p_N = vector of N commodity accounting prices, partitioned into subvectors p_F and p_D

τ_F = vector of nominal *ad valorem* tariff or tariff-equivalent rates on F international goods

w_N = vector of sectoral unit labour cost coefficients, partitioned

λ = accounting wage rate

ρ_N = vector of sectoral accounting values for capital recovery rates, partitioned

Asterisks (*) indicate coefficients measured in the unity prices of the initial input-output data (in which volume units have been redefined in such a way that all commodity market prices equal unity). Consequently, the elements of matrices A^*_{NN} and K^*_{NN} assume the same value when measured in volume and value units. A hat (ˆ) converts a vector into its corresponding diagonal matrix.

Equation (10) shows that the border price of international goods is computed from the domestic producer's price by correcting for the import (export) tariff or tariff-equivalent. In the absence of trade distortions the accounting price for international goods is therefore simply 1; when subject to import (export) tariffs the accounting price is less (more) than 1. Alternatively, accounting prices for international goods could have been determined by correcting the relevant c.i.f. or f.o.b. border price in domestic currency for transport and trade margins at accounting prices. Equations (11) and (12) are conventional input-output price-fix equations saying that the accounting price of a commodity can be built up from the various cost components per unit of output valued at accounting prices. Labour costs are measured using a uniform accounting wage rate for all sectors. Capital costs reflect services of the various capital goods required to produce a particular commodity; they are measured using sectoral capital recovery rates that are applied indiscriminately to all types of capital goods within one sector.

Formulated in this way, the price model has D+1 degrees of freedom, necessitating additional assumptions to obtain a determinate solution. First, equalization of the rate of return to capital in the national sectors can be assumed by implication according to the following D–1 independent conditions:

$$\hat{\rho}_D = \rho I_{DD} \tag{13}$$

As the accounting prices for international goods follow directly from equation (10), or from an alternative approach, they can be considered independent of the rest of

the model. Prices for national goods can be found by solving equation (12) in terms of p_F and the remaining unknowns λ and ρ giving:

$$p'_D = (p'_F H^*_{FD} + \lambda w'_D)(I_{DD} - H^*_{DD})^{-1} \qquad (14)$$

where matrix $H^*_{NN} = A^*_{NN} + \rho K^*_{NN}$.[9] Price equation (14) now expresses the accounting price of the national goods as the sum of the semicumulative (direct and indirect) unit cost of international goods at border prices and of labour valued at the accounting wage. In both expressions allowance has been made for the cost of using capital services in production. Characteristically, indirect costs refer to national products only. Equation (14) can be solved once the accounting wage rate λ and capital recovery rate ρ are known. The vector of (non-uniform) capital recovery rates in the international sectors ρ_F follows residually from equation (11). When the price model is closed with respect to the non-tradable primary factor labour, and the rate of return to capital as implied by the value of the capital recovery factor ρ equals the accounting rate of interest (ARI), the model coincides with the Little-Mirrlees method of calculating accounting prices for non-tradable goods: their price can be expressed in terms of tradables and labour.

When no data on the distribution of value added are available, the expressions for labour and capital costs in equations (11) and (12) can be replaced by a general expression for sectoral value added $\pi'_{0N}\,\hat{\alpha}^*_{0N}$. Vector π_{0N} acts as a vector of price indices with respect to value added (when commodities are measured in market prices, the elements $\pi_{0j} = 1$), and is closely related to measures of effective protection. In this case, D additional assumptions must be made to obtain a solution for the accounting prices of national goods.[10]

To illustrate the actual selection of projects, the data of the preceding section will be used. For the sake of convenience it is assumed that *(a)* investment costs are concentrated in one year; *(b)* annual net benefits are constant during the operation period; and *(c)* capacity expansion in each project has an equal lifetime. Consequently, the selection criteria can simply be formulated as annual net benefits/investment cost ratios. First, the attractiveness of a project in international sectors 1 and 2 will be considered at market prices (table 2).

Table 2. Project appraisal at market prices

	Project effects per unit of output			*Selection criteria*				
	Annual benefits		*Costs*	*Direct*		*Bunch*		*Valuation*
Project in sector	*Value added* (α^*_{0j})	*Profits* (ζ^*_j)	*Investment* (κ^*_j)	*Value added* $(\alpha^*_{0j}/\kappa^*_j)$	*Profits* (ζ^*_j/κ^*_j)	*Value added* $(\tilde{\alpha}^*_{0j}/\tilde{\kappa}^*_j)$	*Profits* $(\tilde{\zeta}^*_j/\tilde{\kappa}^*_j)$	*Commodity prices* (p_j)
1	0.6	0.3	1.8	0.333	0.167	0.373	0.170	1.0
2	0.3	0.2	0.6	0.500	0.333	0.354	0.218	1.0
3	0.6	0.4	3.0	0.200	0.133			1.0
4	0.4	0.1	0.4	1.000	0.250			1.0

[9] When new investment is concentrated in one year and annual net benefits are constant during the operation period, ρ and h can, under certain assumptions, be shown to be identical.

[10] The alternative ways of dealing with non-tradable goods in the theory of protection and their relation to the semi-input-output method are discussed in ten Kate [14].

The national or social gain of projects in sectors 1 and 2 can be measured by the value-added criterion indicating the project's contribution to national income. Value added coincides with social income under well-known conditions: accounting prices for commodities equal market prices and for primary factors other than capital equal zero (implying, among other things, that the full wage bill is eliminated as a cost). The direct-profit criterion measures the private gain of a project following traditional financial analysis: outputs, commodity inputs and primary factors other than capital are valued at their market prices. Under another set of well-known conditions, the profit criterion measures the gain to society: all profits are reinvested, wages are fully consumed, and no value is attached to extra consumption. A comparison of the values for the different criteria in table 2 shows that the ranking, and hence the selection of projects, depends on the criterion used. As a result, different criteria may entail different investment programmes.

Table 3 shows the effect on annual benefits, costs and selection criteria when accounting instead of market prices are used. The system of accounting prices is based on the price model presented above. All project effects have been revalued at accounting prices and are indicated by symbols without asterisks.

Table 3. Project appraisal at accounting prices

	Annual benefits, costs		*Selection criteria*		*Valuation*
Project in sector	*Social profit* (ζ_j)	*Investment* (κ_j)	*Direct* (ζ_j/κ_j)	*Bunch* ($\tilde{\zeta}_j/\tilde{\kappa}_j$)	*Commodity price* (p_j)
1	0.3977	1.417	0.281	0.262	0.8
2	0.0480	0.630	0.076	0.120	0.6
3	0.4145	0.764	0.150		0.716
4	0.0522	0.348	0.150		0.689

$\tau_1 = 0.250$, $\tau_2 = 0.667$, $\lambda = 0.680$, $\rho = h = 0.150$

Because the wage bill valued at accounting prices is now considered a social cost, benefits represent social profit rather than social income in the Little-Mirrlees terminology. It is therefore interesting to compare the analysis of projects 1 and 2 in terms of social profits in table 3 with the financial analysis in terms of private profits in table 2. Not only do benefits and costs differ considerably, the ranking of projects 1 and 2 is also different, and an altogether different investment programme is likely to result.

Some interesting consequences with respect to the selection of projects arise when equalization of the rate of return in the national sectors is imposed, and the corresponding value equals the (cut-off) accounting rate of interest.[11] In this case the selection of projects becomes independent of linkages between international and national sectors because the bunch criterion for a project in an international sector is simply a weighted average of its direct criterion and the ARI (which applies to all national sectors). Once the direct criterion valued at this particular set of accounting

[11] The author is indebted to P. G. Hare for suggesting some of the implications of the Little-Mirrlees method.

prices of a project exceeds (falls short of) the ARI, the corresponding bunch criterion also exceeds (falls short of) the ARI; and projects can be appraised in isolation, as is the rule in conventional project analysis. Reversals of rank may still occur, but only within the two subgroups of projects with direct criteria above or below the cut-off rate (see table 3 where the ARI equalization assumption shows up in a cut-off capital recovery rate $\rho = 0.15$).

The following conclusions can be drawn from the examples presented above. Reversals of rank that occur when using bunch instead of direct criteria illustrate the importance of indirect effects in appraising and selecting projects. Reversals of rank that occur when using accounting instead of method prices emphasize the significance for a project's attractiveness relative to that of others, and hence for its selection. Given the various methods of determining accounting prices, the use of bunch selection criteria becomes mandatory where the derivation of a particular set of accounting prices does not assume an equalization of the rate of return to capital in the national sectors to the accounting rate of interest. When such an equalization is assumed, as in the Little-Mirrlees method, there is no need to calculate complementary indirect effects as far as the selection of projects is concerned.

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Cost-benefit analysis of foreign industrial investments in developing countries

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In recent years there has been an increasing interest in the technique of social cost-benefit analysis[1] as an aid to investment planning in developing countries. Since cost-benefit analysis replaces considerations of commercial profitability with the criteria of social profitability, or net social benefit (NSB), it is most obviously applicable to the appraisal of public-sector projects. However, cost-benefit analysis has also been recommended as a means of quantifying the costs and benefits of projects that involve private foreign investment (PFI)[2] (Little [4], Lal [5, 6]) and a number of case-studies have illustrated how it can be done (Lall and Streeten [7]). It may appear a natural extension of the use of cost-benefit analysis, since the growing debate on the role of transnational corporations[3] in the world economy has stimulated interest in techniques that attempt to measure the impact of these corporations on least developed countries [3, 9].

Despite the growing number of texts, commentaries and case-studies on cost-benefit analysis, its practical usefulness has been questioned. Comprehensive cost-benefit analysis appraisals require much detailed information on the production costs of goods not traded internationally and on a wide range of domestic and international prices, for example, and estimates of the productivity of labour and investment in various uses.[4] The present paper argues that particular practical problems arise in applying cost-benefit analysis to PFI projects that are additional to those encountered in the appraisal of projects without significant foreign participation. For this reason, the limitations of cost-benefit analysis in this context must be borne in mind.

The paper is divided into three sections. Part one outlines the way in which cost-benefit analysis can be applied to projects involving foreign participation; although most attention is given to projects with foreign equity participation, the treatment of foreign non-equity involvement is also considered. Part two discusses

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[1] The term "social cost-benefit analysis" is used here to refer to the methodology set out in Little and Mirrlees [1, 2], Squire and van der Tak [3], which, despite their differences of terminology and presentation, can be seen as a consistent body of literature.

[2] PFI is defined here as foreign participation in a project through equity ownership. Non-equity involvement through, for example, technology licensing or management agreements is also considered here, but in less detail.

[3] Transnational corporations are corporations that operate across national boundaries and own assets in more than one country; see [9] for a discussion of some of the problems of providing a more precise definition. One of the measures used to estimate the growth of transnational corporations is the increase in PFI in the world economy.

[4] The argument that cost-benefit analysis is based on an implicit strategy of free trade (Stewart and Streeten [10]) can be reduced to problems of practical application. In principle, the factors that could justify protection from world market competition, such as "learning by doing" in infant industries or external benefits created by the interrelationship between projects, can be incorporated in cost-benefit analysis appraisals. In practice, however, these factors may be extremely difficult to quantify for an individual project.

how the characteristics of the transnational corporations make it difficult to apply cost-benefit analysis to projects in which they participate. Finally, part three illustrates some of the general points made in part two with reference to an actual investment proposal for a joint-venture polyester fibre plant.[5]

Cost-benefit analysis and the appraisal of projects involving foreign participation

The rationale for cost-benefit analysis is that Governments may have objectives other than commercial profitability that should be taken into account in project selection. Cost-benefit analysis constructs alternative sets of prices, termed shadow or accounting prices, which are judged to reflect more accurately than prevailing market prices the benefits of producing an output and the costs of using an input. Benefits and costs are defined in terms of a contribution to the Government's objectives. Whenever different effects are being compared and quantified, a common unit in which they can be valued is necessary. Cost-benefit analysis describes such a unit as a *numéraire*, and in theory all effects of a project must be expressed as values in terms of the *numéraire*. The main works in the literature of cost-benefit analysis differ significantly only in their choice of *numéraire;* Little and Mirrlees [1] and Squire and van der Tak [3] use government income measured at world prices, and UNIDO [2] uses private consumption measured at domestic prices.[6]

The *numéraire* of government income at world prices is used here to explain the treatment in cost-benefit analysis of projects involving foreign participation, since previous studies have adopted this *numéraire* (Lal [5], Lall and Streeten [7]). The discussion concentrates on what Squire and van der Tak [3] term the "economic analysis" of projects, where projects are appraised in terms of their impact on the government objective of using resources efficiently. The application of "social analysis", whereby, in addition to efficiency, the objectives of higher growth and greater equity in income distribution are also included in the appraisal, is not considered.[7] Projects involving foreign equity (PFI) are examined first, before considering ways in which the analysis will differ for projects with non-equity forms of involvement.

Projects with foreign equity participation

The appraisal of PFI projects in terms of the efficiency with which they utilize resources is summarized below.

The shadow price of all commodities used or produced by a project is based on a price on the world market. Commodities can be divided between traded and non-traded goods. Traded goods are those whose use or production by a project has its main effect on the balance of payments. They are valued at their world market

[5] The proposal was made to the Government of a South Asian country by a well-known transnational corporation.

[6] UNIDO [11] provides a relatively simple introduction to cost-benefit analysis; see pp. 27-32 for a discussion of the *numéraire*.

[7] In theoretical terms the "social analysis" of projects with foreign involvement does not differ from that of purely domestic projects. Further, there are many practical and conceptual problems in the use of social analysis that are likely to limit its application (Weiss [12]).

prices, c.i.f. for imports and importables, and f.o.b. for exports and exportables. Non-traded goods are those whose use or production has its main effect on the domestic economy rather than on the foreign trade balance.

The treatment of non-traded goods is a major problem in cost-benefit analysis, since they are not traded internationally as a result of a project and therefore cannot be valued directly by a price on the world market. Ideally one requires an "equivalent world market price" derived from an estimate of the value of the resources at world prices used in the production of the non-traded item. In practice it may be possible to estimate roughly the average cost of production with all inputs into the non-traded good valued at world prices; alternatively, one may have to use weighted price comparisons (termed "conversion factors") of world and domestic prices for groups of commodities and to assume that the average ratio of world to domestic prices for a relevant group of similar items holds also for the non-traded good in question. The value of a non-traded output produced by a project will be determined by what consumers are willing to pay for a unit of the good. This value will be at domestic prices and must be converted to an equivalent world market price by a conversion factor for consumer goods.

Labour is valued at a shadow wage equal to the output forgone in its alternative employment; whether this output is in the form of traded or non-traded goods, it must also be valued at world prices.

Projects may create effects that raise or lower income elsewhere in the economy. These are termed "externalities" and should be valued in terms of the *numéraire* and included as additional benefits or costs.[8]

The inflow of capital brought into the economy by the foreign investor to cover the equity subscription is a benefit item. Reinvested profits owned by the foreign investor are treated as a capital inflow.

The capital outflows arising from a project, such as repatriated profits or royalties, are costs. Retained earnings that remain in the economy under the control of the foreign investor will create costs if they are repatriated.

All values in world prices are expressed in domestic currency at the official exchange rate. Therefore the foreign-exchange value of capital inflows and outflows associated with a project is converted into domestic currency at the official exchange rate.

All annual costs and benefits are discounted to the present to obtain the net present value (NPV) at shadow prices, at a discount rate that reflects the rate of return at world prices obtainable on a marginal investment project.

Only regarding inflows and outflows of capital is there a difference in treatment between PFI and other projects. The funds brought into an economy by a foreign investor are a benefit when they are received and a cost when they lead to outflows in later years.

In any particular year, the NSB of a PFI project can be written as

$$\text{NSB} = P_{xf}X - \sum_i a_i P_{if} - \sum_j a_j P_{js} - \Sigma_l h_l W_{ls} + E + K - d - v \qquad (1)$$

[8] UNIDO defines externalities simply as "an impact of a project, good or bad, not reflected in its financial accounts" ([11], p. 106).

where

- P_f is the world price of traded good output x. (If the output is a non-traded good an equivalent world price will be required)
- P_{if} is the world price of traded good input i
- X is the quantity of output
- a_i is the quantity of traded good input i
- a_j is the quantity of the non-traded good input j
- P_{js} is the shadow price of non-traded good j (this will be an equivalent world price)
- h_l is the number of workers of type l
- W_{ls} is the shadow wage for type l workers
- E is the net external effect of a project, which can be positive or negative
- K is the capital inflow, including retained earnings controlled by the foreign investor
- d is repatriated dividends and capital
- v is retained earnings controlled by the foreign investor

(The variable v is included in K and subtracted again in equation (1) to allow the derivation of equation (2); $K - v$ gives capital inflow net of earnings retained by foreign investors.)

The NPV of a project can be found by discounting the stream of annual NSB values. If a project produces traded goods, there is an alternative expression for the annual NSB to the economy.[9]

$$\text{NSB} = (P_{xf} - P_{xd})\,X + \sum_i a_i P_{id} - P_{if}) + \sum_j a_j P_{jd} - P_{js}) + \sum_l h_l\,(W_l - W_s) + E + K + p + \tau \qquad (2)$$

where

- P_{xd} is the domestic price of x
- P_{id} is the domestic price of i
- P_{jd} is the domestic price of j
- p is the dividend payments to domestic shareholders if the project is a joint venture
- τ is the tax paid to the Government

Equation (2) states that the NSB of a PFI project is determined by its direct and indirect effects. The direct effects are the external benefits or costs E, the profits for local shareholders P, the taxes paid to the Government τ and the capital inflow K.

The indirect effects are less obvious, however, and are determined by the difference between domestic and world prices for the commodities and factors associated with a project. Whenever the domestic price of a project output exceeds its world price there will be a negative social benefit. On the input side, however, if

[9] Lal [6] explains the link between equations (1) and (2). Both equations give the same NSB value.

the domestic price exceeds the world price, or the equivalent world price, of a commodity or factor, there will be a social gain.[10]

The advantage claimed for equation (2) over equation (1) is that it illustrates the importance of effective as opposed to nominal rates of protection. Effective protection measures the protection given to value added rather than that given to final output and is derived from a comparison of protection rates on inputs and output.[11] The higher the rate of protection on inputs in relation to that on output, the lower will be the effective rate. Equation (2) shows that, *ceteris paribus,* the lower the effective rate of protection, the higher will be the NSB. Therefore, it is in the interest of Governments dealing with PFI projects to offer as low an effective rate of protection as possible.

Where PFI involves acquisition of an existing domestic firm rather than investment in a new project the analysis is similar. The net gain to the economy will be the difference between the new net benefits from the operations of the acquired firm and those that would have arisen in the absence of the take-over. Using equation (1) for any year, this can be expressed as

$$\text{NSB} = (P_{xf}X - \sum_i a_i P_{if} - \sum_j a_j P_{js} - \sum_l h_l W_{ls} + E + K - d - v) - \text{NSB}_1 \qquad (3)$$

where

NSB_1 is the net social benefit that would have arisen from the previous operation[12]

K is the new capital inflow required for the acquisition

The NSB from a take-over will be greater, *ceteris paribus:*

(a) The greater the efficiency of the foreign firm in relation to that of the domestic firm it acquires;[13]

(b) The higher the proportion of funds financing the acquisition, which are brought into the economy, rather than raised domestically.

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[10] For example, in import-substitute projects, if $P_{xd} > P_{xf}$, there will be a social loss, since consumers or users will pay more than the world market price for a commodity, and the Government will lose the tariff revenue it would have received had the goods been imported. In the case of inputs, if a PFI project pays more for an item than its opportunity cost to the economy, the income from the payment will exceed that lost elsewhere as a result of using the item on the project.

[11] The effective rate of protection (ERP) is given by the formula

$$\text{ERP} = \frac{t_x - \Sigma_i a_{ix} t_i}{v_x}$$

where

t_x is the tariff on final output x

a_{ix} is the cost of input i per unit of x at world prices

t_i is the tariff on input i

v_x is value added per unit of x at world prices

[12] In practice it may be difficult to obtain detailed information on the operation of an existing firm, so that NSB may be difficult to estimate.

[13] It has been argued, particularly for Latin America, that the acquisitions of transnational corporations result chiefly from their market power rather than their technical efficiency (Newfarmer [13], Jenkins [14]).

Projects with foreign non-equity participation

To an increasing degree, foreign involvement in projects takes a form other than equity participation.[14] For example, transnational corporations may provide technology in return for royalty payments or management services for a management fee. In such cases the previous equations require modification. The technology or the services provided by the foreign investor are treated in the same way as other inputs in that their benefit will be reflected in their contribution to output; their cost will be the outflow of financial payments agreed in the contract with the foreign investor. In addition, any positive or negative external effects resulting from the use of foreign technology or management services will also have to be considered. Equation (1) can be rewritten so that

$$\text{NSB} = P_{xf}X - \sum_i a_i P_{if} - \sum_j a_j P_{js} - \sum_l h_l W_{ls} + E - \alpha \qquad (4)$$

where α is the outflow of funds in the form of royalty payments or management fees.

Different variants of the same project with different forms of foreign involvement may have different values of parameters such as output level X, technical coefficients a_i or a_j and net external effects E. Therefore, the values of these parameters in equation (1) for PFI may differ from those in equation (4) for non-equity involvement.

Problems in applying cost-benefit analysis to projects with foreign participation

In examining the use of cost-benefit analysis on projects with foreign participation, four problem areas can be distinguished: technology, bargaining, transfer pricing and externalities.

The discussion here concentrates on PFI projects, although some comments are relevant for projects with other forms of foreign participation.

Technology

If cost-benefit analysis is to have a significant effect on resource allocation, shadow prices should be applied at the design stage of the project, before a detailed feasibility study is prepared.[15] The need to allow shadow prices to influence the choice between alternative technologies is common to all projects. In the case of PFI, however, it is particularly important, since access to the technology controlled by transnational corporations is often one of the main motives for inviting PFI. The technology of the transnational corporations is designed almost totally in the light of the factor costs and market requirements of developed economies. Furthermore, it is often argued that transnational corporations have not adapted this technology

[14] See [9], pp. 68-69, for a discussion of such arrangements.

[15] UNIDO argues " . . . what good does it do to give a shadow price to the labour of a tractor driver–it simply makes the capital-intensive farming technique more profitable! Shadow prices must be applied earlier, when the option of using draught animals for cultivation is still open" ([11], p. 6).

substantially to meet resource and market conditions in developing countries. Therefore, prior to a serious consideration of a PFI proposal using modern, foreign-designed technology, the technology should be costed at shadow prices and compared with domestic or foreign alternatives. In some cases no possible alternative can even be identified while in others the data available on other technologies may permit only rough comparisons. Nevertheless, if cost-benefit analysis is to be useful as a means of identifying gains or losses from PFI, it must attempt to answer the question of whether the technology incorporated in an investment proposal is the most appropriate.

Bargaining

Much of the writing on the activities of transnational corporations in developing countries has stressed that the relationship between the host Government and the foreign investor must be viewed within a bargaining framework.[16] The important implication of this bargaining situation for cost-benefit analysis is that host Governments should appraise alternative proposals for a given project and not simply one proposal. The number of alternatives open to a host Government will vary between countries and industries, but for most Governments they are likely to include some or all of the following:

(a) To renegotiate the original proposal on more favourable terms;

(b) To invite alternative proposals from competitors of the original transnational corporations;

(c) To purchase some elements of the PFI package, such as technology or management services, but without foreign equity participation in the project.

Therefore, if the technology embodied in a PFI project is found to be acceptable, cost-benefit analysis must be applied to the range of alternatives that are feasible within the constraints imposed by the bargaining situation. Sensitivity analysis, which tests the effect on the NPV of independent changes in particular variables, will have an important role in this appraisal of alternatives. In the appraisal of any project regardless of whether it involves foreign participation, sensitivity analysis can be used to test the importance of uncertainty about the future value of key variables. However, in practice it is often of only peripheral significance in making the final decision on projects.

In a bargaining situation, however, sensitivity analysis has a central role in any appraisal, since the extent to which changes in the values of items to be negotiated will affect the NPV of the project must be determined; these items include the level of tariff protection on outputs and inputs, the rate of profits tax and the period of tax holiday, the rate of royalty payments, the amount of local inputs used by the project, the degree of local equity participation, and the relative control exercised by foreign and domestic shareholders.

[16] See, for example, Streeten [15]. The success of Governments of developing countries in bargaining is seen to depend upon factors such as the information at their disposal on the industry concerned, the skill of their officials in negotiating, the extent to which there is competition among countries to attract foreign investors and perhaps most important of all, the degree of competition among transnational corporations to enter a particular market.

Equation (2) shows that, *ceteris paribus,* it will be in the interests of the host Government:

(a) To reduce the amount of protection on final output relative to that given to inputs used by the project;

(b) To maximize the use of locally produced, protected inputs and the employment of domestic workers whose income is raised as a result of the new project;

(c) To minimize the negative external effects of projects;

(d) To increase the share of profits that remain in the economy as either taxes or dividends to local shareholders.

The Government must have a view as to the minimum return on the domestic resources committed to a PFI project it will accept. In theory, any PFI project with a positive NPV at the discount rate that reflects the opportunity cost of investment will be acceptable, since in such cases the return on the domestic resources committed to the project will exceed that which could be earned on the marginal investment project. However, although the opportunity-cost discount rate is a critically important shadow price, it is one of the most difficult to estimate accurately. In some cases it can be estimated only within a fairly wide range, such as 10-15 per cent.[17] Projects with an internal rate of return (IRR) within such a range require close examination to see whether they can be renegotiated or redesigned to give an unambiguously satisfactory return. Furthermore, even if a project proposal shows a positive NPV at the relevant discount rate, it does not mean that the host government should not attempt to increase its share of the benefits of the project, subject to the constraint of not forcing the foreign investor to withdraw from the negotiations.

Transfer pricing

The use of world prices in cost-benefit analysis as the shadow prices of traded goods assumes that for most commodities world prices can be identified unambiguously. It has been pointed out that for many goods traded on the world market, prices vary with factors such as sources and conditions of supply and technical or quality specifications.[18] There is an additional problem in the case of PFI projects, however, since much of the international trade of the transnational corporations is intra-firm (see [9]). The prices charged on these intra-firm transactions are not commercial (or arm's length) prices, but are prices internal to a transnational corporation that can be set in the interests of its global strategy. Transfer pricing will occur if a transnational corporation alters the prices charged on its internal sales, in comparison with those that would be set in a commercial transaction on the world market, to alter the location of its declared profits.[19]

[17] See [16] for a discussion of the problems of estimating the correct discount rate for Pakistan.

[18] See, for example, Guisinger and Papageorgiu [17].

[19] The degree of transfer is measured by the ratio

$$\frac{\text{(actual price} - \text{arm's length price)}}{\text{arm's length price}}.$$

Transfer pricing can take place not simply as a response to different rates of profits tax in different economies, but also for a variety of reasons, including overcoming capital repatriation laws, reducing profits to local equity owners and avoiding competitive investments by rival producers or wage claims by local trade unions.

The scope for transfer pricing by subsidiaries of transnational corporations in developing countries is often substantial. Many transnational corporations show a preference for minimizing their financial transfers to developing countries (see [8]), and one way of doing so is to cover their equity subscriptions in projects by providing capital equipment or technology. Also, in the absence of host government intervention, a transnational corporation may prefer to supply intermediate inputs and raw materials to its subsidiaries from other parts of its organization and to sell exports from its subsidiaries through its own marketing channels.[20]

The possibility of transfer pricing presents two separate, but related, problems in applying cost-benefit analysis. First, it means that at the appraisal stage, the conventional assumption that there is a unique set of world prices to be applied in an appraisal is inappropriate. For goods traded through intra-firm transactions, reference prices that would be charged for similar items in a commercial transaction on the world market must be identified. If the prices of such items in a project proposal are above their estimated reference prices, a Government should bargain to bring them down closer to the reference prices. In other words, transfer prices should not be accepted as fixed data for an appraisal, but should be seen as part of the items for negotiation. The degree of transfer pricing is likely to vary between industries, with the greatest abuses in high-technology sectors producing non-standardized products. Where standardized commodities are traded, it is easier to obtain reference prices.[21] However, in the absence of these, Governments may be forced to accept the original price figures in a proposal even though they may suspect that they contain a monopolistic mark-up. This latter can be seen as one of the costs of acquiring the whole PFI package.

This second problem arises even if realistic reference prices can be identified for items sold in intra-firm trade and a proposal is appraised using these prices. The Government has to exercise control over the project to ensure that transfer pricing shall not occur once it is in operation. For example, when a parent company supplies raw materials to a subsidiary, it is misleading for an appraisal to value these at the price at which they could be sold by the parent in a commercial transaction to a third party if the price actually charged to the subsidiary is higher. The cost of these raw materials to the economy is the price recorded in the accounts of the subsidiary, since it will determine the foreign-exchange outflow resulting from the use of these goods. Similarly, on the output side for export goods, where there is transfer pricing the gain to the economy is not determined by the f.o.b. arm's length price, but by

[20] The significance of transfer pricing as a drain of profits out of developing countries has been discussed extensively. Measures suggested to overcome the problem include taxation of physical output rather than declared profits (Lal [5]); channelling key imports through a Government agency; and using local shareholders and management as a check on such practices (Lall and Streeten [7]).

[21] Research has revealed substantial transfer pricing in pharmaceuticals. Lall argues that "the intermediates which account for most of intra-firm trade in this industry (pharmaceuticals) are usually specific in the highest degree. In contrast differentials in other sectors like rubber (or simple) electrical products have been found to be much smaller" ([18], p. 63).

the price recorded in the accounts of the project.[22] Therefore, even where reference prices are known, their use in an appraisal is appropriate only if combined with policies to ensure that transfer pricing shall not take place.

Externalities

Cost-benefit analysis has not yet succeeded in incorporating into appraisals effects created by individual projects but felt elsewhere in the economy. The treatment of a training externality, where a project creates a trained work-force, which if it leaves the project concerned is available for work on other projects, is relatively straightforward.[23] However, other externalities such as the linkage effects of a project on supplier or user industries or the impact of project expenditure on the total level of demand in the economy are more difficult to quantify. Also, there may be important external effects that arise as a result of the expansion programme of an industry or group of industries that are difficult to identify in the appraisal of any individual project. In principle linkage effects can be taken into account in the shadow price of non-traded goods, and interrelated projects can be treated as a single investment, but in practice it is often difficult to do so. One approach is to argue that for industrial projects, in particular, external effects are either quantitatively unimportant in terms of the overall results of an appraisal or do not differ significantly between alternative projects (Little and Mirrlees [1]). However, it is widely recognized that in this area of project appraisal qualitative judgement may have to replace quantitative analysis.[24]

The problem of including external effects in project appraisal is particularly serious in the case of PFI, since whatever the differences of opinion regarding the contribution of PFI to development, there appears to be agreement that its indirect effects may often be as significant as its direct ones. Arguments in favour of investment by the transnational corporations in developing countries include, for example, the spread of "learning effects" in the domestic economy through the input of the technology and skills of transnational corporations; more efficiency in the use of resources elsewhere in the economy, particularly in the industrial sector, as a result of the competition created by the entry of the transnationals; and the development of linkages with domestic supplier industries. In opposition to this, a school of writing on underdevelopment, the *dependencia* school, chiefly of Latin American authors, has grown up around the proposition that contact with the developed countries, particularly through PFI, has very significant negative effects on developing countries in the long run. Arguments against the entry of transnational corporations into an economy include denationalization in the modern industrial sector as domestically owned firms are pushed out of the market or acquired by

[22] The argument above assumes that transfer prices for inputs exceed c.i.f. world prices for comparable items and those for output are below f.o.b. world prices. It may, of course, be the case that in some circumstances transnational corporations may wish to keep funds within a least developed country so that transfer pricing actually favours the economy. This would mean that for inputs transfer prices would be below and for outputs above reference or arm's length prices.

[23] See, for example, the calculations in Weiss [19].

[24] The practical manual of the Ministry of Overseas Development acknowledges that "in principle the appraisal should include estimates of the absolute value of all marginal social costs and benefits to the economy, and not merely the costs and benefits to the project alone. However, in practice it may not be possible to quantify or even identify all possible external effects" ([20], p. 18).

more powerful transnationals; the destruction of small-scale traditional industries as their local markets are taken over by goods produced or marketed by these corporations; and the loss of national control over decisions affecting significant sectors of the economy.

There is sufficient evidence to suggest that Governments should look carefully at the possible negative external effects of the entry of transnational corporations into particular industries.[25] However, regardless of whether such efforts are positive or negative, the important point for cost-benefit analysis is that if they exist they will be difficult to express in quantitative terms. Therefore, where externalities are judged important, often they can be included only in qualitative terms, and judgement must be exercised concerning their overall significance. For example, one can consider whether a potential negative effect on domestic competitors is enough to offset what would otherwise be a positive NPV.

In conclusion, regarding the use of cost-benefit analysis in bargaining with transnational corporations, Governments clearly require quantitative information on the gains to be obtained from particular investment proposals. Cost-benefit analysis can often provide more useful data than a commercial appraisal. However, it cannot provide all the relevant information, so that decisions on PFI cannot be taken on the basis of appraisals of individual projects alone. The limitations of cost-benefit analysis, particularly the approximate nature of some shadow prices, and the existence of transfer pricing and significant externalities mean that decisions on PFI projects must be guided by a general policy on PFI. Here is not the place to discuss the details of such a policy.[26] However, it should include the identification of industries where development is impossible without foreign technology and expertise, or where PFI will not hinder the development of domestic entrepreneurship. Estimates of the relative costs of obtaining essential technology from alternative sources must be obtained. Guidelines should be established on acceptable and unacceptable contractual arrangements with foreign partners, and an effort should be made to control the activities of foreign investors once their projects are in operation. Cost-benefit analysis of individual projects can provide useful data for establishing and modifying such a policy, and appraisals can be guided by it. However, decisions on PFI should not be taken on an *ad hoc*, project-by-project basis. Furthermore, some Governments may feel that the political links and threats posed by the entry of PFI into their economies render nearly all such projects unacceptable. In other words, for them the potential political cost, which in the terminology of the previous discussion can be classed as a negative externality, outweighs any possible short-run income gains. In such a situation cost-benefit analysis has little to contribute to decision making on PFI projects.

Case-study

The PFI project examined here is a plant to produce 10,000 tons of polyester staple fibre (PSF) and 2,500 tons of filament yarn (FY) annually. These synthetic fibres are inputs into the cotton textile industry and can be used to produce cloth

[25] For a detailed case-study of the motor industry in several Latin American countries, see Jenkins [14].

[26] Lall and Streeten [7] discuss the main elements of such a policy in general terms, distinguishing between control of transnational corporations at the macro, industry and firm levels. Lal [5] summarizes the contrasting policies followed in India and Kenya.

made of a blend of natural and synthetic fibres and thus diversify the output of a textile industry. The project proposal was put to the Government of a South Asian country by a well-known transnational corporation and was accepted.

Previously all supplies of PSF and FY had come from imports, so that the need for the project was seen in terms of import substitution. The Government is to be majority shareholder having 51 per cent of the equity, with the parent transnational corporation holding 49 per cent. At the time of writing, the project, under construction, had not yet started production.

Synthetic fibre manufacture is a complex process that cannot be undertaken on the basis of small-scale or labour-intensive technologies. The project proposal discusses two alternative production processes, both involving petroleum-based raw material feedstocks. It recommends the most modern of the two, which it maintains is around 15 per cent cheaper per unit of output. In the synthetic fibre industry even though there may be little scope for choosing technology technical know-how on production processes can be purchased without the selling firm's requiring foreign equity ownership in return. In justifying the new project, the proposal gives several reasons why the Government should not take this option: the new project will become part of the organization of the transnational corporation and will have access to technical developments arising from the research undertaken by the parent; the parent can provide technical assistance to local textile firms to explain how they can adapt their production to the use of synthetic fibres; and exports of fabrics produced from the fibres of the project can carry the brand name of the parent corporation. The first is probably the most significant of the arguments used. However, it is doubtful whether the transnational corporation will have any incentive to modernize the technology of its subsidiary if the latter operates in a protected and highly profitable market.

Before the Government accepted the PFI proposal, it had approved a similar public-sector project that involved purchased technology, but no foreign equity ownership. This project is also under construction. Planning for the industry was haphazard, since no detailed study of the market for the fibres was carried out, even though when both projects were approved the current level of imports was considerably below the capacity output level of even one plant. The possible relationships between the two projects are discussed below.[27]

The PFI project is highly import intensive, since the bulk of the capital equipment and the main raw material inputs, the feedstocks, will be imported. Domestic supplies of the latter are not yet available, and the new public-sector plant will be equally dependent on imports. The parent corporation will provide plant and equipment in lieu of its equity contribution. Equity is only 33 per cent of total investment costs, so that the remainder must be covered by loans, both in foreign exchange and local currency. The investment of the transnational corporation is therefore not in cash but in terms of machinery, and is only 16 per cent of total investment costs. The feedstock raw materials will be supplied by the parent corporation, although it is stated in the proposal that the new company "will be free to purchase some or all of its requirements from other sources at competitive prices".

The proposal states the requirements that had to be met before the transnational corporation would commit itself to the project. The most important of these are:

[27] It is not clear whether a second public-sector project using purchased technology was ever considered as an alternative to the PFI proposal.

(a) "Adequate" tariff protection. Tariff protection must be high enough to ensure that a selling price can be charged that will produce at least a 25 per cent rate of return on fixed assets each year.[28] The demand is not for a particular percentage rate of protection on output, but is a stronger one, since if world market prices fall the nominal percentage rate of protection must rise sufficiently to create the desired rate of return;

(b) Royalty payments equal to 3 per cent of sales value per year for 10 years. This is a charge for the technology of the transnational corporation. The transnational corporation thus receives two forms of return on this technology—royalties and a share in the profits of the project;

(c) Guaranteed permission to repatriate profits and royalties;

(d) Managerial control of the company to remain in the hands of the chief executive, who will be a nominee of the transnational corporation, and who will be given "all the necessary powers for day-to-day management of the Company".

Point *(a)* means that it will be difficult to reduce the effective rate of protection for the project. Since nominal protection on output is determined by a mark-up on costs, if costs are raised as a result of higher tariffs on the imported feedstocks, the extra cost is likely to be passed on in higher selling prices.[29] Point *(d)* shows how effective control can be maintained over the activities of a project without having a majority ownership. The powers entrusted to the chief executive, who can act in the interests of the transnational corporation, are extensive and allow scope for transfer pricing on the purchase of feedstock imports from the parent. Therefore, the assurances regarding purchases of raw materials from outside the transnational corporation network can be ignored if the parent corporation wishes.

If the project is appraised using cost-benefit analysis as discussed earlier and the price data in the project proposal, it appears highly attractive for the economy.

The NSB of the project has been estimated using equation (1). The forecast world prices of the outputs and inputs given in the proposal have been used to value traded goods; all non-traded goods have been converted into a world price equivalent value by an average conversion factor for the economy concerned.[30] Labour is a relatively small item in total costs, and it has been treated in the same way as other non-traded items. The opportunity cost discount rate for the economy is taken to be 10 per cent. Table 1 gives the results of the appraisal. The project has a positive NPV at a 10 per cent discount rate and an IRR of around 20 per cent.

If the results in table 1 are accurate, the Government appears to have reached a highly satisfactory bargain with the transnational corporation, since the IRR is considerably above the returns available on marginal projects. In terms of bargaining possibilities, the NSB to the economy could have been increased still further by raising the tariffs on the imported feedstocks or by reducing the protection on its outputs to force the company to lower its domestic selling price. These measures

[28] These are total assets and not simply the share of equity covered by the transnational corporation.

[29] The proposal argues that a selling price of $1.4 per lb for PSF and $1.8 per lb for FY will be necessary to give the required return on total assets. Compared with the forecast import prices for PSF and FY given in the proposal, these domestic prices imply nominal rates of protection of 27 per cent for PSF and zero for FY. However, if future import prices are lower than those given in the proposal, the rates of protection will be higher.

[30] This is an average ratio of world to domestic prices calculated using the formula for the standard conversion factor (SCF); see Squire and van der Tak [3], p. 59.

Table 1. Results of appraisal using cost-benefit analysis

(Millions of dollars)

Item		Present value at 10%	15%	20%
(1)	Output[a]			
	PSF	113.0	80.9	59.8
	FY	47.3	33.8	25.0
(2)	Capital costs[b]			
	Machinery	16.4	15.7	15.2
	Other	8.5	8.2	8.0
(3)	Raw material feedstocks[c]	67.8	48.6	35.9
(4)	Other operating costs[d]	40.5	30.1	23.1
(5)	Capital inflow[e]	5.5	5.2	4.9
(6)	Royalties[f]	5.2	3.8	2.9
(7)	Capital outflow[g]	10.0	6.2	5.0
	NPV	17.1	7.3	−0.4
	NPV = (1) − (2) − (3) − (4) + (5) − (6) − (7)			

[a] Both PSF and FY are valued at the forecast c.i.f. import prices given in the proposal.

[b] Machinery is valued at the c.i.f. import prices given in the proposal. Other capital costs are non-traded goods, converted from domestic to world prices by a SCF of 0.9.

[c] Valued at the forecast c.i.f. import prices given in the proposal.

[d] Including labour costs that have been converted from domestic to world prices by a SCF of 0.9.

[e] Covers the equity contribution of the transnational corporation. The foreign-exchange loan required by the project is assumed to have been available for other projects and is not therefore treated as a benefit resulting from the project.

[f] Calculated at the rate of 3 per cent of sales value at domestic prices.

[g] Covers repatriated dividends.

would have been incompatible with the transnational corporation's stated objective of a 25 per cent return on total assets, although it might have been willing to accept a lower figure. The rate of royalty payments was a contentious issue in the early stages of negotiation. However, royalties are a relatively small part of total costs, and the overall NPV is not sensitive to their level within a realistic range of values. The project was not offered a preferential rate of profits tax or a tax holiday. The appraisal may be misleading, however, for several reasons.

First, there is the possibility of transfer pricing in the sales of both machinery and feedstocks by the transnational corporation to the project. If the machinery supplied by the transnational corporation to cover its equity subscription is priced more highly than comparable equipment available from other firms, the benefit term, capital inflow, must be reduced to allow for the fact that the real value of the resources brought by the transnational corporation exceeds their price in the project proposal. Similarly, once the company is in operation, if the extensive power of the chief executive allows transfer pricing on the sale of feedstocks, the real cost of these items to the economy will exceed the estimates in table 1. This is not to argue that such transfer pricing is inevitable but that the institutional arrangements made for

the new company allow for this possibility. Table 2 shows the sensitivity of the appraisal to different degrees of transfer pricing. The effect of transfer pricing is to lower declared prices, and therefore repatriated dividends, but to increase raw material and capital costs. The range of transfer pricing examined is 10-30 per cent, which is not high in relation to that found in some industries (Vaitsos [21]). At a 20 per cent rate of transfer pricing on both machinery and raw materials and a 30 per cent rate on raw materials alone, the IRR falls to 11 per cent, and the project is close to being marginal. At a 30 per cent rate on both items, it is clearly unacceptable.[31]

Table 2. Sensitivity analysis: internal rate of return

(Percentage)

A. Effect of transfer pricing

Degree[a]	*Machinery*	*Raw material feedstocks*	*Machinery and feedstocks combined*
10%	18	17	15
20%	17	14	11
30%	16	11	5

B. Effect of divergence of actual from forecast world price

Degree[b]	*PSF*	*FY*	*PSF and FY combined*
10%	14	17	9
20%	10	16	5
30%	<0	12	<0

[a] Degree of transfer pricing is defined as

$$\frac{100\ (\text{actual price} - \text{arm's length price})}{\text{arm's length price}}.$$

[b] Refers to percentage drop in import prices below the forecast figures given in the project proposal.

The second problem with the original appraisal is that it uses the world price of PSF and FY given in the project proposal to value the project output. This world price is the estimate of the transnational corporation and therefore can be inflated artificially to justify the project. When the original proposal was drafted, the world market for synthetic fibres was depressed, chiefly because of an international recession in the textile industry. PSF and FY could be bought at prices less than 50 per cent of those in the proposal.

The proposal maintains that these were dumping prices that scarcely covered the variable costs of production and that the long-run price of synthetic prices in real terms, after allowing for inflation, should rise substantially above current levels.

[31] These results are only speculative, however, since we have no evidence on the actual extent of transfer pricing in this industry.

There is no evidence to suggest actual falsification of the price estimates, although world prices of these items have not risen to the extent predicted in the proposal. However, if a government relies on world price forecasts given by a transnational corporation, the possibility exists that the justification of a project is artificial. Moreover, there will always be a tendency to rely on forecasts of a transnational corporation where world market reference prices are difficult to obtain and where the transnational is recognized as having specialized knowledge of the industry concerned. Table 2 shows that long-run prices for both PSF and FY, 10 per cent below those used in the appraisal, render the project marginal (IRR of 9 per cent), while prices 20 per cent below the forecasts make it clearly unacceptable (IRR of 5 per cent). Given the high level of the original price forecasts in relation to their current and more recent levels, such changes are not unrealistic. This problem is part of the more general one of forecasting future world prices; the point is, however, that some forecasts may not be the result of objective analysis, but are part of the bargaining procedure and may be used to justify particular projects.

The third problem with the original appraisal is that it ignores externalities. Two main external effects are possible, both related to the new public-sector plant to produce the same outputs, approved prior to the PFI project. Both plants were approved in the absence of a detailed study of the market for PSF and FY, despite the low level of current imports.

The growth of the market depends on the speed at which textile mills introduce new machinery or adapt existing machinery to deal with synthetic fibres. On the one hand, the parent transnational corporation may intend to "prime the local market" by supplying mills with PSF and giving technical assistance in overcoming initial problems in its use. This could increase demand for both plants and so increase the level of capacity operation achieved by the public-sector project. Alternatively, if the market remains small and mills are reluctant to shift to synthetic fibres, at least in the early years of both projects, there may be sufficient demand for full-capacity operation in only one project. The existence of a competitor using the brand name of a well-known transnational corporation may mean that the public-sector project will have difficulty in selling its output, so that its output level will be significantly less than it would be in the absence of the PFI project.

Both effects are possible, but in either case it is difficult to value them. However, if either were judged to occur, it would have to be taken into account, in addition to the estimated NPV and IRR, in the decision on the PFI project.

Finally, even if it is established that the growth of the domestic market will justify two new plants, there is a choice as to whether the second plant will involve PFI or purchased technology with no equity ownership. A cost comparison between these alternatives is required even if the NPV and IRR of the PFI proposal appears acceptable, assuming the availability of sufficient local managerial resources to establish a second project.

Conclusions

Superficially the PFI project examined here appears highly attractive. The modifications to the appraisal have not demonstrated that it is incorrect, but they have suggested areas where more information is needed and other considerations that might affect a decision on the project's acceptability. This case-study regarding decisions on PFI projects shows that Governments often require considerably more

information than is provided in a project proposal. For example, in this case it is necessary to know the interrelationship between the growth of the industries, textiles and synthetic fibres, data on world prices for machinery, raw materials and synthetic fibres and the costs of purchasing technical know-how. The issue of control is also important, since the proposal suggests an obvious means of divorcing majority ownership from effective control and thereby allows potential scope for abuses by the parent transnational corporation. Cost-benefit analysis appraisals of individual projects should not be seen as the only check on investment proposals by transnational corporations. More information, control and an overall strategy on the role of PFI will be required. Within this framework cost-benefit analysis can be useful. The truism is that wise decisions on projects require data on more than the projects themselves.

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Transition towards more rapid and labour-intensive industrial development: the case of the Philippines

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Objectives of industrial policy

In the 1980s industrial policy in the developing countries will necessarily have to face the task of accelerating output and export growth and ensuring that new investment will create more jobs. Industry now assumes a commanding position in all but the very poor and small countries, and no development strategy is conceivable that does not assign a specific role to manufacturing industries. Countries will want to be able to generate their own momentum of industrial growth to assure a reliable supply of key inputs and enhance their own technological capability, while at the same time benefiting from the dynamics of the world market. The objectives of policy must be achieved despite a likely shortage of long-term capital, which is of particular significance for large-scale, capital-intensive manufacturing. An equilibrium must be struck between generating employment and expanding exports on the one hand and achieving the strong and well-balanced industrial structure needed for longer-term growth on the other.

In most developing countries industrialization was initially biased in favour of import substitution. Governments played a substantial role in providing incentives and finance. The pros and cons of these policies have been extensively discussed in the literature.[1] While import substitution industries grew rapidly in the 1950s and early 1960s, they slowed down significantly in the past 10-15 years. However, since the late 1960s, a growing number of countries have increased their manufactured exports dynamically, mostly of labour-intensive items.

The issue for many countries in the 1980s is how they can reorient their industrial policies towards achieving increased growth in the home industries while maintaining the forward momentum of the export industries. This will require broad-based improvements in the performance of home industries, stressing greater utilization of comparative advantage and product specialization associated with job creation, training and entrepreneurial development, improved capital efficiency and technological development. Increased reliance on more rational industrial incentives will have to be combined with industry-specific planning and investment. In the view taken here, reform in incentive systems must be carried out hand in hand with investment planning and execution and hence be part of a comprehensive programme of industrial development. The impact of more rational incentive policies cannot be left

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[1] For a recent review, see Bhagwati and Srinivasan [1].

merely to "the market", but must be supported by industry-specific rehabilitation, restructuring and investment.

A related general issue is the likely coexistence and necessary integration of efficient export industries with initially often less efficient home industries. The former can be built up rather quickly, frequently with production and marketing assistance from abroad; financing requirements are moderate and easy to meet. The home industries are older and well entrenched, many receiving special fiscal and financial incentives and high protection. Industrialists and entrepreneurs in the two sectors may have quite different characteristics, with home producers being well established and export producers rather new on the scene, sometimes small-scale operators, and experiencing difficulties in getting investment finance from conventional sources. Reorienting home industry towards a more open economy and greater efficiency may take considerable time and investment. But increasing integration between home and export industries seems essential if the latter are not to remain a dynamic enclave in a slower economy and the former are to improve their contribution to development objectives.

The orientation of industry must necessarily be labour intensive: most countries have a rapidly growing labour force, already suffer from high unemployment and have a comparative advantage in labour-intensive production. But this does not mean that large-scale, capital-intensive industries must be neglected. On the contrary, they are needed to achieve balance in the industrial structure, provide a strong base for long-term development and technological deepening. But, as exemplified by the case discussed in this article, in a world of scarce capital and foreign-exchange resources, decisions on large-scale, capital-intensive projects must be based on a careful weighing of the economic costs and benefits.

The experience in the Philippines is presented here as an illustration of the policy issues that arise in a reorientation of industrial development. The country has several characteristics that give its experience wide applicability:

(a) The Philippines is a middle-income country with a moderately sized market. While its market size permits some economic operation of large-scale, capital-intensive industry, its manufacturing growth must inevitably be in tune with the world market;

(b) It has a substantial supply of low-cost labour that has proved to be highly productive under suitable conditions and can be easily trained;

(c) For almost a decade its foreign trade and exchange regime has been liberalized significantly, although tariff protection is still high. The Philippines has conducted a "realistic" and flexible exchange-rate policy and has made a highly successful start in promoting exports. Although the deterioration in the terms of trade has made management of the balance of payments difficult, issues of industrial and trade policy do not have to be tackled in a crisis atmosphere. Continued export growth is essential for a sound balance-of-payments position;

(d) The Ministry of Industry, Board of Investments (BOI) and other government agencies have built up a competent technical staff, which makes it possible to pursue a comprehensive and rational industrial policy, undertake industry-specific planning, and provide investment incentives and finance;

(e) Given the present limited scope of basic industries, planning must strike a balance between large-scale, capital-intensive industries on the one hand and labour-intensive industries on the other;

(f) The country has formidable problems in overcoming poverty and disparities among geographic regions. It has initiated policies favourable to small-scale enterprises and regional development to help overcome these problems.

Achievements in manufacturing in the Philippines[2]

Changes in policy since the 1950s

Manufacturing has become a significant factor in Philippine development and will continue to be so. It now accounts for one fourth of the GDP and, in relative size, compares well with that of Mexico and the Republic of Korea. Any Philippine development strategy must specify the role of industry in raising output, creating employment and more equitable conditions among population groups and geographic regions.

The pace and pattern of Philippine industrial growth suggest that the 1970s marked a significant change in that an increasing proportion of industry became labour intensive.

In the 1950s and 1960s industrialization tended to favour production for the home market, and incentives benefited capital-intensive industries in particular, including raw material processing for export. The industrialization pattern may well have reinforced regional and income disparities, since its effect in expanding employment and raising income of the poor was small.

Starting in the 1950s, import substitution of consumer goods became the principal policy instrument to promote industrialization. Initially, the manufacturing sector responded favourably, with output growing at an average annual rate of over 12 per cent from 1950 to 1957. However, by the late 1950s, the domestic market started to limit the expansion of the sector, and output growth fell to an average level of 5 per cent per annum. The sector no longer led Philippine development.

Although the strict import restrictions prevailing in the 1950s were gradually decontrolled in the early 1960s, they were replaced by a highly protective tariff system (instituted in 1957). Policy reform in the 1960s therefore did not alter the bias of the incentive system in favour of import substitution. Manufacturing was limited in its backward integration and in developing new exports. Since 1956, total employment in the manufacturing sector remained virtually constant at 10-12 per cent of total employment, growing at an average rate of less than 3 per cent per annum.

Since 1970, the industrial incentive policies of the Philippines have undergone several significant changes, including a steep devaluation, measures to help small, labour-intensive industries and the introduction of various export incentives. As a result of these new measures, both growth and labour intensity have improved, and the industrialization may well have reached a turning point in the second half of the decade.

[2] Changes and impact of longer-term trends in policy have been analysed by several authors, including Baldwin [2], Bautista and Power [3], Power and Sicat [4] and Valdepenas [5]. See also ILO [6] and World Bank [7].

Export growth

The rapid growth of non-traditional manufactured exports is changing the composition of industrial output, accelerating its growth and creating many more jobs. These exports increased by 30 per cent per annum in real terms, over the period 1972-1977 and exceeded $1 billion in 1978 (28 per cent of total export earnings).

The impetus of manufactured export growth has come from a few labour-intensive products; garments and electronic products and handicrafts accounted for two thirds of the total in 1978. In addition to its strong resource base, the comparative advantage of the Philippines lies in the utilization of skilled low-cost labour. In the export industries, Philippine labour productivity and management compare favourably with those in competing countries. Since 1972, as a result of shifts in the exchange rate and wage relationships, Philippine wages have declined significantly relative to those in both competitor and customer countries (vis-à-vis the Federal Republic of Germany, Japan and Republic of Korea by 50 per cent and the United States of America by 17 per cent). While the productivity in home (non-export) industries has lagged, productivity in Philippine export industries improved by 13 per cent during the period 1969-1974, thus until recently keeping pace with manufacturing productivity in such countries as the Federal Republic of Germany, Japan and Republic of Korea. At present, Philippine wages are about one third to one half of those in competing countries such as the Republic of Korea. The Philippines and other countries in a similar position can benefit from a widening of the markets for their products as these competing countries, in response to increases in their own labour costs and to the filling of import quotas for their products, move towards higher quality and more sophisticated products.

Structure of industry

The Philippine manufacturing structure is highly dualistic. The distribution of both employment and value added has a very pronounced skewedness. "Unorganized" manufacturing employs nearly two thirds of the manufacturing work force, but produces only a small fraction of total value added in manufacturing. However, the "organized" sector clearly produces most of the value added in manufacturing. The unevenness between shares in value added and employment is even more marked for the large establishments (over 200 workers) and has become increasingly pronounced over time.

The composition of manufacturing value added has changed little over the last 10 years. Food processing, including beverages and tobacco, has consistently contributed well over one third of total manufacturing value added. The contribution of the chemical industries, including rubber and products of petroleum and coal, has steadily increased in importance, while the share of all other industries has gradually fallen. As expected under the prevailing tariff and trade regime, consumer goods constituted about 55 per cent of manufacturing value added until 1970. But its share fell to 47.9 per cent in 1977 mainly as a result of the rapid increase in the production of intermediate goods, particularly chemicals (see table 1).

Cross-country comparisons, based on a methodology adopted from Chenery and Syrquin [8] show that, given the country's size and income level, the Philippine manufacturing sector as a whole is larger (measured as a percentage of GNP) than one

Table 1. Composition of gross value added in manufacturing

(Percentage)

Industry and item	*1967*	*1970*	*1977*
Food, beverages and tobacco	41.1	41.8	39.4
Textiles, clothing and leather	10.9	9.9	9.5
Wood, cork, furniture	6.2	4.9	4.2
Paper products, printing	4.9	5.3	5.2
Chemicals and related products	15.9	16.5	22.5
Non-metallic mineral products	4.6	4.2	3.3
Basic metals	2.6	4.2	4.0
Fabricated metal, machinery and equipment	12.6	11.8	10.8
Other manufacturing industry	1.2	1.4	1.1
Total	100.0	100.0	100.0
Total manufacturing value added (billion pesos, 1972 prices)	9.8	11.8	18.8
Share of manufacturing in GDP (%, current prices)	21.2	22.5	23.9
Share of consumer goods in GVA[a] (%, 1972 prices)	56.9	54.9	47.9

Source: NEDA, *National Income Accounts.*

[a] Defined roughly as food, beverages, tobacco, textiles, clothing, leather, furniture, printing, other industries.

would expect, while its services sector is smaller. Within the manufacturing sector, this seems to be mainly the result of the large size of resource-based industries (food and wood) and to a lesser extent of the chemical industries. On the other hand, the textiles, clothing and metal industries appear to be considerably smaller than expected from international comparison (see table 2). A comparison with the Republic of Korea shows that the Philippine food industry is larger than that of the Republic of Korea.

Investment, capital intensity and growth

The pattern of investment changed but little between the 1960s and the first half of the 1970s despite the tariff and export policy measures taken in the early 1970s. The food and textiles industries received the major share of manufacturing investment during the period 1960-1975, closely followed by such capital-intensive sectors as chemicals, oil and coal products, non-metallic minerals and basic metals (see table 3).

The share of investment in industries with low capital-labour ratios remained constant during the periods 1960-1969 and 1970-1975. Yet both output and employment growth in these industries accelerated sharply during the period 1970-1975 (table 4). Average annual growth of output in industries with higher capital-labour ratios, on the other hand, fell considerably during the period 1970-1975 while their employment growth rate remained the same. Owing to the distribution of capital intensity over Philippine manufacturing branches, industries

Table 2. Comparison of the structure of Philippine manufacturing with cross-country structural norms, 1973[a]

(Percentage)

Industry	Share in GNP[b]			Share in total manufacturing[c]		
	Observed (actual)	Predicted (norm)	Residual	Observed (actual)	Predicted (norm)	Residual
Food	8.11	4.06	4.06	37.54	24.10	13.44
Textiles	1.83	2.60	−0.77	8.46	15.46	−7.00
Clothing	0.29	0.73	−0.44	1.33	4.34	−3.01
Leather	0.04	0.11	−0.08	0.16	0.67	−0.50
Wood	1.13	0.55	0.58	5.21	3.25	1.96
Paper	0.62	0.52	0.10	2.85	3.09	−0.25
Printing	0.42	0.45	−0.04	1.93	2.69	−0.76
Chemicals	4.16	2.31	1.85	19.25	13.71	5.54
Rubber	0.42	0.42	—	1.93	2.50	−0.57
Non-metallic minerals	1.01	1.04	−0.04	4.65	6.21	−1.56
Basic metals	1.10	1.19	−0.08	5.11	7.07	−1.96
Metal products	2.19	2.43	−0.25	10.12	14.46	−4.35
Miscellaneous	0.32	0.28	0.03	1.46	1.68	−0.22
Total	21.62	16.83	4.79	100.00	100.00	—
Primary sector[d]	38.26	36.31	1.95			
Industrial sector[e]	24.11	21.62	2.49			
Services sector	37.64	42.07	−4.43			

Source: World Bank "Pattern of Industrial Development" Project.

[a] Comparison between the composition of Philippine manufacturing output and the results of a 93 cross-country regression analysis aimed at determining the average, or "norm", industrial structure at different levels of development and according to country size.

[b] Share of sectoral value added in GNP.

[c] Share in total manufacturing value added.

[d] Including agriculture and mining.

[e] Including manufacturing and construction.

such as textiles, beverages, printing are shown in table 4 as industries with a below average Kb/N ratio (see table 5). There is thus a reasonable indication that recent investment was channelled into more capital-efficient production processes with lower capital-labour ratios, i.e., a reduction of the pronounced bias in favour of capital intensity prevailing in the two previous decades.

While the Philippine incentive system has tended to encourage capital-intensive industries, visits to individual plants suggest that Philippine manufacturing usually employs fairly labour-intensive methods. One encounters few, if any, cases of excessive capital intensity. Economic data on 44 plants visited by a World Bank mission are given in table 6. Export-oriented firms had a capital investment per worker of $2,800 and firms with predominantly domestic orientation, $22,000. The recent growth of labour-intensive industries in the organized sector has thus significantly enhanced the contribution of manufacturing to Philippine employment.

Average capital investment per unit of labour employed tends to rise with the size of establishment, except in the case of the furniture industry. Capital efficiency (as indicated by value added per unit of capital) shows considerable variation among

establishment sizes in different industries. Small establishments are more efficient in their use of capital than larger enterprises in such industries as tobacco, textiles, wood manufacturing and miscellaneous, mainly light, industries, e.g., rubber shoes, foundries and metalworking plants. On the other hand, larger establishments appear to be more capital efficient in the food and beverage industries, furniture manufacturing and in capital-intensive industries producing chemicals, oil and coal products and transport equipment (see table 7).

Manufacturing employment

The growth of manufacturing employment reflects the dualistic structure of the sector. At 1.6 million jobs in 1977, manufacturing provided only just over 10 per cent of total national employment, with as much as 1 million in the cottage sector. Factory employment has tended to rise more than twice as fast as total manufacturing employment (see table 8).

Table 3. Manufacturing: value added, output and investment in 22 industrial branches, 1960, 1970 and 1974[a,b]

(Millions of 1972 pesos)

Industry	Value added			Output			Investment	
	1960	*1970*	*1974*	*1960*	*1970*	*1974*	*1960-1969*	*1970-1975*
Food	1 061	1 805	3 149	2 455	4 640	9 402	1 481	1 876
Beverages	294	602	565	466	1 013	1 141	262	360
Tobacco	185	516	627	405	1 060	1 392	180	279
Textiles	222	489	769	603	1 329	2 260	1 034	1 197
Footwear, clothing	144	127	113	410	337	279	101	85
Wood	163	305	314	401	791	830	485	679
Furniture	35	32	49	74	67	125	33	22
Paper	100	223	356	251	610	1 022	216	752
Printing	133	192	170	246	368	432	151	119
Leather	17	13	12	44	40	39	16	6
Rubber	122	233	208	255	484	522	162	143
Chemicals	375	959	1 016	1 002	2 607	3 024	660	634
Petroleum and coal		535	830		1 647	4 090	584	634
Non-metallic mineral products	139	288	415	233	561	1 073	677	885
Basic metals	59	300	355	124	1 080	1 474	636	611
Metallic products	211	192	220	495	609	835	248	147
Machinery	72	71	209	111	137	407	57	121
Electrical machinery	120	271	308	246	620	787	192	261
Transport equipment	113	259	299	288	753	1 216	175	336
Other	275	95	155	455	245	447	96	226
Total	3 840	7 507	10 139	8 564	18 998	30 797	7 446	9 373

Source: NCSO, *Annual Survey of Establishments* and NEDA, *National Income Accounts.*

[a] Establishments employing at least 5 workers.

[b] Series deflated by the National Accounts Implicit Price Index.

Table 4. Manufacturing: capital intensity, investment and growth in output, value added and employment, 1960-1974[a,b]

(1972 prices)

Industry and capital intensity	Kb/N (1974)	Investment 1960-1969 (thousand pesos)	Investment 1970-1975 (thousand pesos)	Percentage of total 1960-1969	Percentage of total 1970-1975	Average annual growth (%) Output 1960-1970	Output 1970-1974	Value added 1960-1970	Value added 1970-1974	Employment 1960-1970	Employment 1970-1974
Oil and coal products	621 191	584[c]	634	7.8	6.8	9.7[c]	25.5	5.2[c]	11.6	4.8[c]	4.0
Food	24 469	1 481	1 876	19.9	20.0	6.6	19.3	5.5	14.9	3.3	7.1
Remainder, of which	16 899	5 381	6 863	72.3	73.2	7.6	8.0	6.4	4.5	5.5	7.2
Above average industry Kb/N[d]	43 913	2 189	2 882	29.4	30.7	11.7	7.9	10.2	4.9	7.8	7.9
Below average industry Kb/N[e]	10 064	3 192	3 981	42.9	42.5	5.7	8.1	4.9	4.3	4.9	7.0
All industry	19 957	7 446	9 373	100.0	100.0	7.4	12.8	6.0	7.8	5.0	7.1

Sources: NCSO, *Annual Survey of Establishments;* NEDA, *National Income Accounts.*

[a] Establishments employing at least 5 workers.

[b] Deflated by the National Accounts Implicit Price Index.

[c] Data for 1961.

[d] Industries included in this category are: non-metallic minerals, paper, basic metals and chemicals. Oil and coal products and food products are also above the average Kb/N but are excluded.

[e] All other industries except those in footnote *d*.

Table 5. Manufacturing: value added, output and investment arranged by industrial branch and by declining Kb/N ratio, 1960, 1970 and 1974[a,b,c]

(Millions of 1972 pesos)

Industry	Kb/N (1974)	Value added			Output			Investment	
		1960	1970	1974	1960	1970	1974	1960-1969	1970-1975
Oil and coal products	621 191	340	535	830	717	1 647	4 090	584	634
Non-metallic minerals	70 314	139	288	415	233	561	1 073	677	885
Paper	57 793	100	223	356	251	610	1 022	216	752
Food	24 469	1 061	1 805	3 149	2 455	4 640	9 402	1 481	1 876
Basic metals	23 777	59	300	355	124	1 080	1 474	636	611
Chemicals	23 771	375	959	1 016	1 002	2 607	3 024	660	634
Transport equipment	15 033	113	259	299	288	753	1 216	175	336
Rubber	13 435	122	233	208	255	484	522	162	143
Textiles	13 157	222	489	769	603	1 329	2 260	1 034	1 197
Beverages	12 494	294	602	565	466	1 013	1 141	262	360
Wood	11 874	163	305	314	401	791	830	485	679
Printing	11 041	133	192	170	246	368	432	151	119
Machinery	10 933	72	71	209	111	137	407	57	121
Metal products	10 424	211	192	220	495	609	835	248	147
Electrical machinery	10 036	120	271	308	246	620	787	192	261
Miscellaneous	9 821	275	95	155	455	245	447	96	226
Tobacco	9 519	185	516	627	405	1 060	1 392	180	279
Leather	6 502	17	13	12	44	40	39	16	6
Furniture	4 294	35	32	49	74	67	125	33	22
Footwear and clothing	2 341	144	127	113	410	337	279	101	85
Average	19 957	4 180	7 507	10 139	9 281	18 998	30 797	7 446	9 373

Sources: NCSO, *Annual Survey of Establishments;* NEDA, *National Income Accounts.*

[a] Establishments employing at least 5 workers.

[b] Deflated by the National Accounts Implicit Price Index.

[c] The capital-labour ratio (Kb/N) described above is based on the book value of fixed assets, which differs considerably from the replacement cost of fixed assets (Kr). The Kb is used in the *Annual Survey of Establishments* and does not account for price distortions, while the Kr requires some data manipulation to account for price distortions and equipment life. The Kb for all industries, for instance, is $2,734, while the Kr is $11, which represents a more realistic cost per job for the industry as a whole.

Table 6. Data on plants visited by World Bank mission

(Average per plant)

Item	All firms	Export firms	Non-export firms
Investment (million dollars)	14.6	3.0	22.2
Number of jobs	1 033	1 083	1 002
Sales (million dollars)	17.3	4.5	22.0
Exports (million dollars)	7.1	6.0	8.5
Value added (million dollars)	8.2	1.2	10.6
Investment per job (dollars)	14 114	2 764	22 111
Value added/sales (%)	47	26	49
Export/sales (%)	41	71	37
BOI benefits/sales (%)	7.8	6.8	8.9

Source: World Bank estimates.

Table 7. Manufacturing: capital per worker, labour productivity and capital efficiency in the factory sector, 1974[a]

(Millions of 1972 pesos)

Industry	*Capital per worker (Kb/N) Number of workers*			*Labour productivity (VA/N) Number of workers*			*Capital efficiency (VA/Kb) Number of workers*		
	5–19	*20+*	*Total*	*5–19*	*20+*	*Total*	*5–19*	*20+*	*Total*
Food	5 934	30 009	24 469	4 089	55 332	43 523	0.689	1.844	1.779
Beverages	3 269	12 547	12 494	5 361	46 416	46 182	1.640	3.699	3.696
Tobacco	667	9 524	9 519	5 667	44 035	44 014	8.500	4.624	4.624
Textiles	2 227	13 493	13 157	3 847	13 965	13 661	1.727	1.035	1.038
Footwear, clothing	1 978	2 815	2 341	2 767	5 923	4 136	1.399	2.104	1.767
Wood	3 022	12 974	11 874	5 175	12 126	11 365	1.712	0.935	0.957
Furniture	4 836	3 932	4 294	4 212	8 075	6 527	0.871	2.054	1.520
Paper	7 231	57 436	57 793	10 323	46 163	45 303	0.143	0.804	0.784
Printing	4 760	12 128	11 041	6 694	20 001	18 039	1.406	1.649	1.634
Leather	4 777	6 976	6 502	4 586	8 750	7 852	0.960	1.254	1.208
Rubber	8 337	13 571	13 435	11 185	25 085	24 726	1.342	1.848	1.840
Chemicals	19 380	23 929	23 771	17 869	55 336	54 348	0.922	2.313	2.286
Oil and coal products	98 687	627 743	621 191	16 563	1 003 515	991 293	0.168	1.596	1.596
Non-metallic products	7 084	78 751	70 314	4 602	27 320	25 097	0.650	0.353	0.357
Basic metals	7 398	24 104	23 777	9 585	33 432	33 092	1.296	1.387	1.392
Metal products	5 690	11 624	10 424	8 779	21 791	19 134	1.543	1.875	1.836
Machinery	5 658	111 911	10 933	9 089	30 357	26 926	1.606	2.549	2.463
Electrical machinery	7 832	10 101	10 036	9 154	25 040	24 639	1.169	2.479	2.455
Transport equipment	7 483	15 490	15 033	3 064	31 556	30 215	0.409	2.037	2.010
Miscellaneous	3 537	10 659	9 821	7 689	14 270	13 496	2.174	1.271	1.374
Average	4 689	22 571	19 957	4 514	33 677	29 414	0.963	1.492	1.474

Source: NCSO, *Annual Survey of Establishments.*

[a] Establishments employing at least 5 workers.

Table 8. Rates of employment growth in Philippine manufacturing, 1956-1976

Type and size of establishment (number of workers)	*Employment*				*Annual growth 1956-1976 (%)*	*Incremental growth 1956-1976 (%)*
	1956		*1976*			
	(Thousand)	*(%)*	*(Thousand)*	*(%)*		
Organized (factory)						
5–19	55	5.7	80	4.8	1.9	3.5
20+	151	15.7	550	32.7	6.7	55.6
	206	21.4	630	37.5	5.8	59.1
Unorganized (cottage industries)						
1–4	756	78.6	1 050	62.5	1.7	40.9
Total	962	100.0	1 680	100.0	2.8	100.0

Source: NEDA.

A complex of causes accounts for limited labour absorption of Philippine manufacturing. The most labour-intensive sector, the cottage industries, has remained the most important in providing employment but, in terms of employment growth, has steadily lagged behind the more capital-intensive factory sector. Within the factory sector, the Government had a considerable influence on the composition of new industries and the choice of technology through the provision of official credit and investment incentives. In the 1960s, output and investment in industries with higher capital intensity grew more rapidly than in more labour-intensive industries. Investment incentives went predominantly to capital-intensive industries producing for the home market and processing primary exports. These incentives themselves had a pro-capital bias, and the pricing of capital goods in the economy reinforced the capital-intensive bias in the factory sector.

With the growth of labour-intensive, non-traditional manufactured exports after 1970, however, labour absorption of Philippine manufacturing has improved. The employment elasticity during the period 1970-1977 in non-traditional export manufacturing was 1.0 as against 0.6 for processed primary exports and 0.32 for industries producing for the home market. Consequently, exports of non-traditional manufactures accounted for more than 30 per cent of manufacturing employment creation during the period 1970-1977 while accounting for less than 8 per cent of manufacturing investment.

Industrial policy—an assessment of performance

The industrial growth of the Philippines reflects in several respects the orientation of policy pursued by the Government over a period of two or three decades. Industrial policy will be discussed here under three headings: tariff protection, investment incentives and export promotion.

Before turning to these principal policy areas, it would seem well to recapitulate some of the major problems to which policy must be addressed. Mention has already been made of the sluggish employment record and the slow output growth in home

industries in recent years, slow particularly in relation to other middle-income countries in Asia and the Pacific or the major Latin American countries. Further, except for resource-based industries, manufacturing growth has been heavily concentrated in the Manila metropolitan area for reasons of orientation towards the home market, geography, infrastructure and credit availability. This combination of forces, operating in a geographically diverse island republic, has caused one of the most marked degrees of industrial concentration anywhere. Growth has proceeded to a point where several industries, e.g., food processing and clothing, have now reached a state of maturity in which they no longer need special incentives. Reduced reliance on special incentives makes the pursuit of adequate general policies (especially exchange rate, financial and budgetary) even more essential. On the other hand, while certain industries have grown rapidly, others have been left behind, notably the producer goods industries. To live up to their potential, these industries should receive more incentives.

A number of industries are in need of rehabilitation or new investment to make them more efficient and competitive and to enable them to make better use of capital. Some of these also suffer from "overcrowded" conditions, a state of excess capacity caused by a complex of factors, including poor incentives for sound facility planning, sometimes excessive availability of long-term (often concessionary) finance for new facilities. The Government is aware of these conditions and is taking action to correct them.

Emphasis is placed on the need for continuing expansion of labour-intensive industries. But the Government also wants to give attention to certain imbalances in the industrial structure which to correct will require substantial investments in capital-intensive industry. Failure to correct them may eventually impose a costly burden on the industrializing economy. Thus the cement industry should be expanded if it is to keep abreast of prospective domestic demand. And while the country has developed a steel-rolling industry, it still imports slabs and billets, items the supply of which could become unreliable or costly should world-wide shortages occur. Hence, there is a case for considering an integrated steel operation to establish balance in the industry. As is also true for the petrochemical industry, the large investments involved (and their poor payoff in terms of total employment creation) make careful economic planning and time-phasing essential.

Tariff protection

The combined effect of the present incentive measures is to build a bias in favour of production for the home market and impose a penalty on the export industries, except for those with access to duty-free imports. Philippine incentives also have had the effect of lowering the price of capital goods relative to consumer goods. Tariffs have favoured more capital-intensive import substitution, while the tariff on capital goods has itself been low. In addition, investment incentives have the effect of reducing the cost of capital equipment. It is the larger, usually more capital-intensive firms that have benefited most from these incentives.

The key element characterizing Philippine industrial policy since the early 1950s has been the protection of the domestic industrial sector from competition from imports. The level of protection rates for the domestic market is high and has remained so since the mid-1960s. The data in table 9 are based on the 1974 tariff

code and do not allow for redundancy. The average level of effective protection for the entire economy in 1974 has been estimated at 54 per cent by Bautista and Power [3]. For manufacturing, the average level of effective protection increased from 51 per cent in 1965 to 125 per cent in 1974. A major cause was the increase in effective protection for consumption goods, which reached an average of 247 per cent in 1974. As such, the cascading structure is further evidenced by the decline in effective protection afforded to the capital goods sector (34 per cent in 1965 *versus* 18 per cent in 1974). The capital goods sector is underprotected. The export sector is penalized where producers are subject to taxes, in particular on their inputs. In practice, under the Export Incentives Act many export firms have, since 1970, been put on a free-trade basis. Since 1974, several tariff items have been reduced, but the 1974 estimates still correctly reflect the overall tariff structure and level.

Table 9. Effective rates of protection for major product and end-use groups

(Percentage)

Item	*1965*	*1974*
Exports	−19	−16
Manufacturing	51	125
Capital goods	34	18
Intermediate goods	65	23
Consumption goods	86	247

Source: 1965 estimates are from John H. Power and Gerardo P. Sicat, *The Philippines: Industrialization and Trade Policies* (New York, Oxford University Press, 1970), p. 99. The 1974 estimates are those of Norma A. Tan, "The structure of protection and resource flows in the Philippines", Industrial Promotion Policy Project at the University of the Philippines (Manila, 1974).

Tariff protection has had an adverse impact on manufacturing in several aspects:

(a) It has tended to channel resources into industries, usually capital intensive, where the Philippines has less comparative advantage and has penalized labour-intensive products (e.g., simple producer goods in the mechanical engineering industry);

(b) It has encouraged high costs, inefficient use of capital and excess capacity. Examples are the textile and steel-rolling industries;

(c) It has penalized exports by taxing imported inputs or permitting domestic inputs to be produced at high cost and low quality. The penalty imposed on those export industries subject to tariffs on their inputs averaged 16 per cent in 1974. Examples are textiles, steel products and cans (for the food processing industry).

Effective protection in the Philippines seems to be in the middle range when compared with other countries. Countries that have experienced very poor performance with respect to economic growth and export growth have frequently had high rates of effective protection. For example, Chile and India have been among the developing countries protecting their industrial sectors most heavily (see table 10). Their average annual total export growth rates for the period 1966-1973

Table 10. Average effective protection for manufacturing in selected developing countries

Country	Year	Average rate of effective protection in manufacturing (percentage)
Argentina	1958	162
	1969	89
	1977	39
Brazil	1966	181
	1967	76
	1973	47
Chile	1961	182
Colombia	1969	29
India	1961	313
Malaysia	1965	6
Mexico	1960	27
Pakistan	1964	271
Philippines	1965	51
	1974	125
Republic of Korea	1968	−1
Thailand	1969	50[a]
	1971	40[a]

Sources: Bela Balassa and Associates, *The Structure of Protection in Developing Countries* (Baltimore, Johns Hopkins Press, 1971), p. 54; Ian Little, Tibor Scitovsky and Maurice Scott, *Industry and Trade in Some Developing Countries* (London, Oxford University Press, 1970), p. 174; Larry E. Westphal and Kwang Suk Kim, "Industrial policy and development in Korea", World Bank Staff Working Paper No. 263 (Washington, August 1977), pp. 3-10; Thomas L. Hutcheson, "Incentives for industrialization in Colombia", University of Michigan, Ph.D. dissertation, 1973, p. 68; William G. Tyler, *Manufactured Export Expansion and Industrialization in Brazil* (Tubingen, J. G. B. Mohr, 1976).

[a] Estimates are for the import-competing manufacturing sector only.

have been a slow 5 per cent and 8 per cent, respectively; manufacturing exports grew not at all in Chile and at 7 per cent annually for India.[3] In addition to the association between low rates of effective protection and high rates of manufactured export growth, reductions in high rates of protection are frequently associated with an acceleration in industrial export growth. In Argentina, Brazil, the Republic of Korea and Thailand, substantial growth in manufactured exports accompanied measures to liberalize imports.

Investment incentives

Complementing protection through tariffs are fiscal incentives granted under the Investment Incentives Act (1967) and the Export Incentives Act (1971). The legislation, administered by BOI, is designed to stimulate projects where domestic capacity falls short of domestic demand and projects with export potential.

[3] See Balassa [9].

A wide range of industries have received benefits from BOI. Under the Investment Incentives Act, the most benefits have gone to copper smelting and refining (36 per cent of total benefits in 1977), pulp and paper (16 per cent of 1977 total), chemicals and chemical products, and synthetic textile fibres. From available data it would appear that under the Investment Incentives Act the industries that have received the most benefits in recent years are raw material processing, pulp and paper, chemicals and chemical products and synthetic textile fibres.

A substantial proportion of the fiscal benefits granted consists of subsidies on the use of capital. For projects registered under the Investment Incentives Act, the exemption of import taxes on imported capital equipment and the accelerated depreciation allowance amounted to 40 per cent of the total value of the incentives granted in 1977 (65 per cent in 1975). While these incentives are also significant for export projects, other incentives, not involving a subsidy on capital use, emerge as the most relevant. In particular, the provision allowing for the deduction from taxable income of an amount related to labour costs, and expenditure on indigenous raw materials accounted for 53 per cent of the value of the incentives to export-oriented, BOI-registered firms in 1977. The tax credits for import taxes on products used in export production accounted for an additional 21 per cent. Tariff exemptions on imports used in export production are permitted under three additional programmes: *(a)* the permission for some BOI-registered firms to operate bonded manufacturing warehouses; *(b)* the drawback scheme, which refunds the tariffs paid; and *(c)* export processing zones.

The protective effect of the investment incentives has been small in the aggregate. Although tariff rates averaged 38.9 per cent in 1974, it has been estimated that the tariff equivalent of tax subsidies averaged only 1.4 per cent. The reason for this insignificance at the aggregate level is that the incentives and the output of BOI-registered firms are quite small in relation to output for the entire industry. However, seen from the point of view of the individual firm, BOI benefits can be an important factor in its profitability. Measured as a percentage of sales, the benefits frequently do not exceed the equivalent of more than 2-3 per cent, but sometimes range up to 25-30 per cent (Bautista and Power [3]).

If the magnitude of the investment incentives for domestic market production is seen to be quite small in the aggregate, the same is the case for the incentives for exports. Yet the aggregate is not the most relevant measure. What matters is the effect that the incentives have on the profitability of individual firms. The BOI incentives can reach considerable magnitudes, especially if large investments are made. For the aggregate of all recipient firms in 1977, the total subsidies and rebates received under the Export Incentives Act amounted to 9 per cent of their export sales. This amount has increased in recent years; in 1973, it was only 3 per cent.

Benefits under the Investment Incentives Act have tended to go to the larger and more capital-intensive firms, both firms producing for the home market and primary export processing firms. In 1977, some 62 per cent of benefits went to firms in industries with above average capital intensity. A small portion of the benefits went to smaller firms (e.g., with fixed assets of less than 5 million pesos). On the other hand, benefits under the Export Incentives Act have been more evenly distributed over firms of varying size and have gone to more labour-intensive firms. Export-oriented firms have received benefits under both Acts, with the benefits under the Investment Incentives Act going to more capital-intensive firms than those under the Export Incentives Act. Finally, the capital intensity of BOI-preferred

projects was generally higher than industry averages while capital efficiency estimates were lower.

Besides fiscal benefits, registration with BOI may convey additional advantages. Such registration in effect constitutes a governmental recognition and tacit approval of the firm and its activities. On the basis of this recognition, the firm's dealings with other agencies of the Government may be facilitated. For instance, with a BOI letter of endorsement, it is easier for a firm to obtain foreign exchange for marketing efforts abroad. In addition, the Central Bank is also said to treat a firm's requests for import licences more expeditiously if it is a BOI-registered firm. Finally, BOI registration may facilitate access to long-term credit from official financial institutions.

As the manufacturing sector grows, it is important that the fiscal incentive system be simplified and administered with a minimum degree of case-by-case discretion. Then the technical staff assembled over the past decade could focus on priority issues and economic evaluation. The range of possible incentives is complex and could be narrowed down, *inter alia*, by making selected incentives generally available. Decisions on investment incentives should increasingly be governed by considerations of employment creation, comparative advantage and regional dispersion of industry.

The list of priority industries has become very long. Greater selectivity would result from more detailed subsector planning such as is needed in the metalworking industries. In the next phase of Philippine industrialization the provision of adequate long-term finance may be more important than special fiscal incentives. Subsector planning and investment decisions should be linked with the extension of long-term finance.

Export promotion

The effect of the protection system in the Philippines is to impose the equivalent of a tax on the export sector, the magnitude of which is roughly reflected by the average level of protection. Estimates of the distortions imposed on the economy range from 19 to 34 per cent (Bautista and Power [3]). The higher estimate, based on the UNIDO procedure, assumes the existing protective structures. The actual price effect in case of full removal of protection might, of course, be smaller, depending on the accompanying adjustments in the balance of payments, in particular the increase in exports that would be associated with a change in protection policy.

The tariff and tax disincentives for export industries have, since the early 1970s, been partly offset by putting approved export producers on a free-trade basis. Bonded (manufacturing) warehouses and other arrangements free exporters from paying duty on imported inputs, which would otherwise represent a sizeable penalty on export production (e.g., equivalent to 150 per cent of value added in the garment industry). These facilities are separate from the fiscal incentives described in the previous section. As is evident from the dynamic growth of non-traditional manufactured exports, industries under this selective free-trade regime have benfited greatly, and the profit opportunities provided by free-trade arrangements for serving large export markets have been sufficient to draw some resources away from the more profitable but limited domestic market. However, as a group, potential direct and indirect export industries that are subject to tariffs still pay a significant penalty on export sales. Continued export growth—which would rely in part on achieving

both a more diversified product mix and higher net foreign-exchange earnings through indirect export of domestically produced inputs—will require elimination of this penalty.

Several further improvements can be made in the present export-promotion system. The various methods through which duty-free importation currently takes place tend to be either time-consuming and burdensome (and thus tie up working capital) or too restrictive in terms of eligibility requirements (bonded manufacturing warehouse system). Costly paperwork and procedures required by various government agencies create overhead expenses and delays and thus act as a disincentive for exporters. Furthermore, the rates of the short-term export-financing facilities of the Central Bank are high compared with those charged for export financing by countries with which the Philippines competes. Many of the smaller or newly established exporters are not aware of the existence of this export-credit facility or are discouraged by its procedural requirements. Their access is also limited because of the bias of the commercial banking system against high-risk export financing for industries without an established track record.

Ideally, all manufactured export industries should be on a free-trade regime to the maximum extent feasible. This involves: *(a)* duty-free importation of raw material and components; and *(b)* provision of additional assistance where necessary. The present system is restricted to selected firms in direct export manufacturing. It tends to place the smaller firms at a disadvantage, as well as "indirect exporters", i.e., domestic suppliers to export firms. A broader approach would need to be accompanied by improved financing facilities for raw material and semi-finished inputs.

Policies for accelerating growth

Looking to the future, Philippine industrial development will benefit from continued and broadened expansion of manufactured exports and, in the home industries, better utilization of capital and domestic resources, improved job creation and training of labour and a deepening of technology. By becoming more competitive and concentrating on branches where the Philippines has a comparative advantage, home industries should also be able to export an increasing share of their output, either directly or indirectly.

To realize these potentials, several steps are required. These do not represent a break with present policies, but instead evolve from them through adaptation to new conditions and opportunities. A lowering of protection and simplification of investment incentives are needed to improve the performance of the home industries by increasing their competitiveness, capital efficiency and employment effects. Changes in the various elements of the export-incentive system are needed to solidify and broaden the manufactured export drive. But, however essential, changes in incentive measures must be supplemented by related action in several other areas: credit policy, industry-specific planning, vocational training, technological assistance and special measures in the regional dispersal and small industry programme.

The central element will have to be a gradual but broad reduction in import protection, evening out present differences in effective rates.

Since import-substitution policies have extended over a period of two decades or more, a large and influential group of businesses will be affected. Further, as already observed, cost competitiveness and efficiency in several industries will need to be

improved through rehabilitation and new investment. Thus the lowering of protection cannot be undertaken in isolation but instead should be part of a comprehensive programme of new investment and industrial growth. Careful and detailed economic and technical studies have already been made in preparation for the reduction of protection.

In some industries, for example textiles and steel, reductions in import protection will have to go hand in hand with programmes to improve the efficiency and competitiveness of the industry. But in certain simple producer goods industries, where the Philippines' dynamic comparative advantage is currently underutilized, protection could be increased selectively as new projects are identified and executed; thus the present low tariff in these industries would be brought closer in line with a reduced level in the rest of the manufacturing sector. In other cases, present levels of effective protection might be permitted to continue on certain conditions (e.g., export of a minimum proportion of output).

Credit measures will have to go hand in hand with the application of other incentive measures. The full impact of changes in industrial policies in favour of technological development, labour-intensive production, small industry and regional dispersion will only be realized as they are matched by corresponding expansion of private commercial credit and the allocation of investment credit. Technical and technological assistance should be supplied more effectively in a way that permits individual firms or plants to benefit. The specialized institutes, e.g., those operating in mechanical engineering, forest products, textiles and food and nutrition, should be in close contact with plant operations and focus more sharply on actual industrial practices. Their operations should also feed into the assistance rendered under the small-industry programme. In addition, the technical institutes may be instrumental in improving vocational training in selected industries.

The reforms in the incentive system will require concerted action. Where tariff changes are geared to conditions in specific industries they must be contingent on the preparation and execution of programmes for these industries. These programmes must, in turn, be given priority when investment finance is allocated. Import licensing will need to be relaxed for those items that will receive lower duties lest continued licensing make the tariff reduction ineffective. Export promotion will need to be backed up by credit policies. Investment incentives would, in certain cases, encourage export of part of the output from new investments, but they would usually not be granted if the new investments required effective protection above the level set as a general objective.

Industrial investment priorities

It is essential that the policy reforms described be accompanied by increased investment in priority industries. Total manufacturing investment may reach at least $12.5 billion (in 1977 prices) during the eight years 1977-1985, if the country is to accelerate output growth, expand exports and create more jobs. This would be more than double the investment in the previous eight years. An ordering of investment priorities makes this investment perspective more concrete, even though it must necessarily be incomplete and tentative.

Top priority should be assigned to continued expansion of labour-intensive manufactured export industries and a broader participation in the export drive. At present, with the notable exception of cottage industry handicrafts, export industries

are heavily concentrated in and around Manila. Value added in manufactured export industries is a mere 25 per cent. The greater part of raw material inputs of most export industries is imported. Net foreign earnings from manufactured exports are at best only 40 per cent of gross. Only the wood, handicraft and food processing industries rely on domestic raw materials, and these industries should be put in a position to expand more rapidly than others. Domestic industries should increasingly be able to supply a larger share of the requirements of export industries. If backward linkages are to be successfully developed, the capital efficiency and cost levels of input-producing home industries will have to be improved through measures discussed previously. In addition, new export product lines will have to be introduced as the growth of older ones slows. Technological deepening of manufactured exports with the help of the specialized institutes and foreign investors (joint ventures) and greatly improved vocational training will over the medium and long term—be instrumental in both increasing the proportion of value added and the skill component and diversifying the product mix.

The non-traditional export industries are projected to take up less than 10 per cent of manufacturing investment (some $1.2 billion over the period 1977-1985 in 1977 prices) even though they may create 15 per cent of new output and almost 40 per cent of new employment in manufacturing. These estimates assume an 18 per cent growth rate in labour-intensive manufactured exports.

Having equal priority with the present major export industries are special industry programmes for the footwear and furniture industries envisaged as a component of the small-industry programme and small-scale weaving. The footwear and furniture industries are labour intensive and potentially export oriented, and the furniture industry utilizes domestic raw materials. The smaller enterprises in both industries require more technical and marketing assistance, some improvement in equipment and help in improving domestic raw material supplies; they are also suitable for more extensive regional dispersal.

The food processing industry, the largest single industry in terms of output and employment, has a significant role to play in improving utilization of rich domestic resources for home consumption, greater production of nutritious low-cost foods, exports and regional (resource-oriented) development. New investments in this industry may be moderate—some $30 million in the next few years—but substantial additional effort is needed to improve raw material supplies. The employment-generating effect of supplying larger quantities of agricultural materials is several times greater than that of the processing industry itself. Export potential, assuming adequate resource development (fruits and fisheries), is large, rising from $100 million at present to $500 million in the mid-1980s.

Next in priority are industries where new investment or rehabilitation is necessary because of their impact on output, capital efficiency and employment creation. There is strong evidence that investment in these industries will have a high economic return because it will make possible considerably lower production costs and increased capital efficiency and enable the industries to supply at least part of their output to export industries (textiles and steel rolling), or enable the Philippines to exploit a comparative advantage (e.g., selected projects in the mechanical engineering industry, including the foundry industry). Investment and rehabilitation in these industries can be designed to correct conditions that at least in part have been caused by excessive (or unduly prolonged) protection and/or excessive finance, or relative neglect by the incentive system (e.g., the producer goods industry).

Some of the points of particular interest in the industry programme in this category of priority may be mentioned briefly here:

(a) The textile industry rehabilitation programme (approximately $250 million). About half the industry is efficient, but the rest suffers from obsolescent machinery and can at present survive only as a result of high protection (50-70 per cent nominal, over 100 per cent effective protection). Rehabilitation would be combined with increased product specialization and would reduce costs and improve utilization of capacity. Some of the new output could be exported—in fact, some export could be a condition for receiving investment incentives and finance. The programme would go hand in hand with (and be conditional upon) a lowering of protection (to uniform levels to be determined as the programme is prepared);

(b) The steel-rolling industry. A number of rolling mills, particularly the larger and newer ones, can be operated economically. Some mills require modernization, and rounding out of an investment (approximately $100 million) would expand the capacity of National Steel's cold rolling mill to its ultimate potential of 700,000 tons per year, almost four times its present level. The investment would permit the company to increase productivity, lower costs of production, and ultimately to lower prices—hence make possible lower protection—and still obtain an economic return;

(c) The mechanical engineering industry. In the interest of efficient longer-run development, producer goods should receive greater incentives from the Government, including more technical assistance and long-term investment finance. New investment or expansion in the producer goods subsector could amount to $100 million in the next few years. Areas of immediate opportunities could be mining and material handling equipment. Foundries, fabrication shops and machine shops require new tooling;

(d) The cement industry. A rehabilitation programme is needed to restore run-down facilities. It would also include improvements in pollution control and have a coal conversion component. The programme could require an outlay of some $130 million.

Finally, there are several capital-intensive industries deserving attention in the next 5-10 years. Among these are cement (some $1 billion for expansion to be carried out in stages) and integrated steel (at least $1.3 billion). The proposed integrated steel project would ensure a more reliable supply of steel to Philippine industry over a period when steel-using branches will gain importance.

The large investment in steel should be compared with other high priority claims in infrastructure, agriculture and other branches of manufacturing. Investment in these other areas would not necessarily come at the expense of steel and vice versa, but a balance must be struck among competing priority claims lest the efforts of continued manufactured export growth and necessary industrial rehabilitation fail. The steel investment would initially require an outlay about equal to the total annual capital expenditure of the Government (10 billion pesos in the fiscal year 1978). Within the industrial sector, the steel investment can be compared with the total investment in non-traditional manufactured exports of some $1.2 billion in the period 1977-1985, which is projected to create new jobs for 360,000 workers and net additional foreign-exchange earnings of at least $1 billion per year by 1985. The steel investment is more than three times as large as the combined outlays required for the rehabilitation of the textile and cement industries.

The benefits of rehabilitation and investment

The policy and investment measures described above are designed to help the Philippines make better use of its comparative advantage and its capital, labour and raw material resources. The pay-off on these measures can be considerable in terms of increased exports, employment and total output growth. On the other hand, the cost of not taking the measures could be very high, especially in terms of employment opportunities forgone.

Broadening support for manufactured exports would enable the Philippines to utilize its cost and productivity advantages and make possible a growth rate of labour-intensive manufactured exports of at least 18 per cent per annum. While this represents some slow-down, export growth now proceeds from a much larger base. In fact, total non-traditional manufactured exports may exceed $3 billion in the mid-1980s, assuming that the growth of industrial countries will not fall significantly below 4 per cent per annum in the next decade. Conditions in customer markets are constrained by protectionist attitudes, but for many Philippine products quotas have not yet been filled. Considerable opportunities exist for developing new and higher-quality items and breaking into new markets.

Further, the measures outlined would make possible a broader participation in export growth in several respects: more and smaller firms, greater regional dispersal of export production, new product and market development, increased skills, and a greater share of inputs to be procured at home. They should thus also help in increasing the proportion of value added in non-traditional manufactured exports and the net foreign-exchange earnings from them.

Export growth alone will not be sufficient to improve the performance of the manufacturing sector. Increasing the rate of growth and the capital efficiency of home industries is essential, since they now account for 85 per cent of manufacturing output and employment.[4] Several of the measures discussed, in particular, lowering protection, placing greater emphasis on labour-intensive industries in the administration of investment incentives and setting up special investment programmes for strategically placed industries would improve home-industry performance. The small-industry and regional diversification programme would help in spreading the benefits of industrial growth. A shift towards more labour-intensive investment would be in line with Philippine comparative advantage and the overriding need for providing productive jobs. This will involve, among others, placing greater stress on promising small and labour-intensive industries and developing the mechanical engineering industry.

Continued growth in labour-intensive manufactured exports and greater attention to employment effects of home-industry investment would bring about dynamic changes in the composition of manufacturing employment and its contribution to creating jobs in the economy. Moreover, as the domestic industry becomes a more efficient producer of intermediate inputs, the linkages between the export sector and the domestic economy can be strengthened. Manufacturing growth will also contribute very substantially to employment in the service sector (transportation, finance, procurement, marketing) and the construction industry.

[4] As an illustration, 10 years of growth at 8 per cent in home industries and 20 per cent in export industries would produce an average growth rate of 10.7 per cent for the sector and reduce the share of home industries from 85 per cent of sector output at the start of the period to 66 per cent at the end.

Improved capital utilization at home and continued export expansion should make possible an acceleration in manufacturing growth to at least 8 per cent. Employment growth in manufacturing would triple, and the direct contribution of manufacturing to the increase in total national employment would rise from 10 per cent in the period 1970-1977 to 20 per cent in the period 1977-1985. In all, the manufacturing sector would account for close to one million new jobs during the period 1977-1985, growing at an annual rate of 5.9 per cent or about twice its historic rate. This improvement would come about even though the large cottage sector would grow only very little. The export industries would contribute 46 per cent of all new employment in manufacturing (see table 11).

These employment projections imply a decrease in the capital-labour ratio from $30,000 (1970-1977) to $20,000 (1977-1985) in home industries and an increase in the employment elasticity of manufacturing output from 0.32 to 0.57 in the two periods. Such changes can be expected from continued export expansion and to employment effects and capital efficiency in investment decisions.

In the absence of the various policy measures, the employment elasticity would not improve, and output growth might likewise be lower—say, at the 6 per cent of recent years or less instead of the 8 per cent assumed earlier. This would mean that employment in home industries would continue to increase by only 1.9 per cent (instead of 4.2 per cent), reaching 1.6 million in 1985 (instead of 1.9 million). If, in addition, non-traditional exports were to increase at a slower pace—say, by 12 per cent foreseen for all developing countries—the cost in terms of jobs lost would be another 160,000 jobs per year by 1985. In total, the loss in new jobs resulting from slower growth and greater capital intensity would be 450,000-500,000 jobs by 1985 (see table 12).

The projected changes in employment are not out of line with those observed in other countries in the region. The Philippines' projected growth in manufacturing employment of 5.9 per cent per annum for the period 1977-1985 is less than what was achieved by Malaysia (6.6 per cent per annum, starting from a low base) and the Republic of Korea (15.2 per cent per annum) over the period 1970-1975. In the Republic of Korea, in 1969-1970, manufactured exports contributed 38 per cent to employment growth in manufacturing and 33 per cent in the economy (including indirect employment generation); in 1970, exports accounted for one quarter of manufacturing employment. As manufactured exports became more important in the Republic of Korea, the cottage sector also declined in relative importance.

Concluding remarks

This article supports a broad concept of the incentive system. Although the analysis is focused on protection, fiscal incentives and export-promotion measures, they must be supplemented and supported by several other elements of industrial policy, especially credit allocation, technological assistance and investment. Neither analysis nor policy can be complete if industry-specific planning and investment (and the associated strengthening of institutions) are not brought into the picture.

In the industrial strategy described, vigorous manufactured export growth is placed first, both because of its essential contribution to output growth and a viable balance of payments and to new employment in the manufacturing sector (close to one half of new jobs provided by the sector in the next decade). The estimates of

Table 11. Manufacturing growth, incremental capital-output ratio, 1970-1985

Sector	Output[a]			Gross value added[b]			Investment[c]		Employment[d]		
	1970	1977	1985 (proj.)	1970	1977	1985 (proj.)	1970-1977 (est.)	1977-1985 (proj.)	1970	1977	1985 (proj.)
	(Billions of pesos at 1977 prices)								(Thousands of workers)		
Manufactured export sector											
Traditional manufacturers	9.3	13.9	24.0	3.7	5.6	9.6	4.2	8.8	92[e]	120	180
Non-traditional manufacturers	0.9	5.4	20.2	0.2	1.4	5.0	3.0	9.0	20[e]	140	500
Domestic market-oriented industries[f]	68.8	106.7	185.8	20.6	30.8	54.4	32.3	75.8	1 211	1 420	1 920
Total manufacturing of which:	79.0	126.0	230.0[g]	24.5	37.8	69.0[g]	39.5	93.6	1 323	1 680[h]	2 600
Factory sector[i]									404	630	1 440
Unorganized sector									919	1 050	1 160[j]

Sources: NCSO, *Census of Establishments and Annual Survey of Establishments;* Emmanuel A. Hife, "Factor productivities and intensities in Philippine manufacturing with emphasis on establishments size", Industrial Promotion Policies Project at the University of the Philippines (Manila, 1974); IBRD estimates.

[a] For exports, an exchange rate of $1.00 = ₱ 6.5 is used for 1970; a rate of $1.00 = ₱ 7.5 is used for 1977-1985.

[b] The following value added coefficients are assumed: 0.4 for traditional manufactures; 0.25 for non-traditional manufactures; 0.3 for total manufacturing sector.

[c] The following ICORs are assumed: 2.2 for traditional manufactures; 2.5 for non-traditional manufactures; 3.0 for total manufacturing sector.

[d] The following capital-labour ratios are assumed: ₱ 150,000 for traditional manufactures; ₱ 25,000 for non-traditional manufactures; ₱ 100,000 for total manufacturing sector (1977).

[e] Estimated on the basis of the 1969 Philippine input-output data.

[f] Data are calculated as residual.

[g] Based on a real rate of growth in gross value added of 8 per cent per annum during 1977-1985.

[h] Because of a fall in total manufacturing employment between 1976-1977, the estimate for 1976 is used.

[i] Establishments employing more than 5 workers.

[j] Employment in the unorganized sector assumed to grow at its historic rate of 1.5 per cent per annum during 1977-1985.

Table 12. Alternative projection for manufacturing gross value added and employment, 1985

Sector	*Alternative 1*[a]		*Alternative 2*[b]		*Alternative 3*[c]		*Alternative 4*[d]	
	GVA (billions of pesos/ 1977 prices)	*Employment (thousands of workers)*	*GVA (billions of pesos/ 1977 prices)*	*Employment (thousands of workers)*	*GVA (billions of pesos/ 1977 prices)*	*Employment (thousands of workers)*	*GVA (billions of pesos/ 1977 prices)*	*Employment (thousands of workers)*
Manufactured export								
Traditional manufactures	9.6	180	9.6	180	9.6	180	9.6	180
Non-traditional manufactures	5.0	500	5.0	500	5.0	500	3.4	340
Domestic market oriented	54.4	1 920	54.4	1 670	49.1	1 600	49.1	1 600
Total manufacturing of which:	69.0	2 600	69.0	2 350	63.7	2 280	62.1	2 120
Factory sector		1 440		1 190		1 120		960
Unorganized sector		1 160		1 160		1 160		1 160

[a] From table 11.

[b] Same as alternative 1, but assuming employment elasticity of home industries to be equal to its historic rate (1970-1977) of 0.32 only.

[c] Same as alternative 2, but assuming growth rate of home-industry GVA to be equal to its historic rate (1970-1977) of 6 per cent per annum only.

[d] Same as alternative 3, but assuming a real growth rate of non-traditional exports of 12 per cent per annum only.

future growth are illustrative; while they may appear high, they are moderate in comparison with the achievement of some other countries in the Pacific region and well within the potential of the Philippines. An export growth strategy can be successful in an expanding and "open" international environment and in countries with a reasonably low-cost and well-trained labour supply and relatively free entry of capable entrepreneurs (both indigenous and foreign) into the export sector. While the Philippines meets these conditions, a genuine concern exists that export growth may be frustrated by protectionism and economic constraints in the industrial countries. Consequently, emphasis should be placed on strengthening the competitiveness and the productive and technological capacity of both the home and export industries. Without broad-based industrial and technological development, the export effort will make only a shallow contribution to longer-term growth. The policies recommended are needed not merely in the interest of manufactured export growth but, more broadly, of efficient resource utilization for longer-term development of the entire manufacturing sector.

Export growth can initially be achieved despite the well-entrenched position of import-substitution industries receiving high protection. Parallel with the export-promotion effort, attention is being given to the modernization, rehabilitation and restructuring of home industry, by far the more important sector in terms of output and employment. It holds the key to increasing capital efficiency and investment returns in the economy. It includes the more capital-intensive industries that are needed to assure a reliable supply of intermediate goods and industrial raw materials at economic prices. Simplification of investment incentives and reduction in protection, greater emphasis on the utilization of comparative advantage and domestic resources and on job creation are essential ingredients of industrial policy. A move towards greater freedom in trade and industrial policies must be part of a more comprehensive programme of industrial development.

The manufacturing sector, through emphasis on labour-intensive industries, plays an essential role in employment policy. Other sectors are more important in employment creation, especially services, construction and rural reform. But manufacturing can often make a more important contribution than it has made in the past, and the secondary effects are often a multiple of the direct effects. For the poorer groups of the population, industry can lead the way to higher incomes, since its jobs are productive and rewarding. It plays a key role in improving the economic prospects of outlying regions and small cities. Industrial incentives can be designed to accelerate geographic dispersion. The cottage industries, very important but with a sluggish record overall, need special attention focused on their more dynamic components, lest incomes in this sector fall too far behind the rest of the economy.

Many opportunities exist to increase the links between manufacturing and the rest of the economy and between industrial and other aspects of development policy. Improved job training, often industry-specific and sponsored by industrial associations or institutes, is a key element in enhancing value added and sophistication of production and design. In the crucial food processing industries, greater agricultural supplies are essential, including supplies from small farmers to help avoid excessive concentration in the industry. Export industries can obtain domestically an increasing share of their needs as home-industry efficiency improves. Regional dispersion may also be instrumental in making possible greater access to indigenous raw materials and skills.

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Choice of technology and industrial transformation: the case of the United Republic of Tanzania

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The United Nations Second Development Decade witnessed a considerable amount of promotional effort in the field of labour-intensive (appropriate) industrial technology. This work arose from the growing realization that employment opportunities in developing countries were not being increased adequately to absorb the labour supply. Some of the pioneering work was included in studies by the International Labour Organisation of Colombia, Kenya, Sri Lanka and others [1]. Much academic effort has gone into identifying appropriate technologies, evaluating their efficiency, both in static and dynamic terms, identifying the determinants of technological choice, and the policies and strategies suitable for their promotion.[1]

This paper is concerned with the relationship between choice of technology and industrial strategy. The ultimate objective of industrialization, it may be safely assumed, is not merely to provide current employment or more manufactured goods, but to contribute to and if possible accelerate the long-term growth and enrichment of the economy (however measured). Consequently, it is also reasonable to assume that the objective of labour-intensive industrialization, although it may to some extent substitute current for future employment, cannot be divorced from the objective of economic growth. Society will trade off long-term growth for current employment, if necessary, but at a low and decreasing rate.[2] If long-term growth is a key objective, then industrial strategy may be regarded as of primary importance.

The contention of this paper is that the choice of appropriate industrial strategy, in terms of pattern of growth and composition of output of industrial goods, should precede the selection of techniques of production. The reasons for this are, first, that this approach is more likely to ensure the long-term growth of industry in terms of output and employment; and, second, that, as will be argued, choice of technology has been and is inevitably determined to some extent by the composition of output. In such a case it would be impractical to arrive at an appropriate industrial strategy by basing it simply on labour-intensive projects without any wider concerns.

The composition of industrial output is an important parameter not only because of its effects on choice of technology, but also because it is a measure of the "transformation" of industrial production. Transformation is taken here as meaning the process by which industry is restructured from the type of structure associated with a colonial-type primary producer economy to that of an economy producing a

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[1] See, for example, Bhalla [2], especially studies of textiles, sugar, cement blocks, can making and metalworking; Jequier [3], including studies of sugar, ceramics and footwear; Pickett and others [4], including leather, iron foundry products, maize milling, brewing, fertilizer, footwear, nuts and bolts. Also individual studies by Pickett and Robson [5]. A recent theoretical overview of the whole question is found in Stewart [6]. Further useful case material has *inter alia* come from Marsden [7] and Timmer [8]. An older, pioneering work on the subject is Boon [9]. Also see Sen [10], Stewart [11] and Morawetz [12].

[2] Stewart and Streeten [13] discuss exhaustively the relationship between current and future employment.

balance of manufactured and primary goods. This transition involves characteristic shifts in the pattern of industrial output.

General political and economic forces have influenced the choice of techniques both directly and through their effects on the composition of output; consequently it is impractical to promote labour-intensive technology without taking account of a country's political and economic environment. This is not a new idea, but in view of the widespread efforts that have taken place to promote labour-intensive technology in isolation from the political and economic factors that affect the characteristics of industrial production, it is worth restating.

To provide an illustrative background, we examine the case of the industrial sector in the United Republic of Tanzania, a country whose allegiance to objectives of employment generation, via labour-intensive decentralized production, particularly over the period 1967-1977, is well documented.

Technology and industrialization in the United Republic of Tanzania

As was the case with other developing economies, the structure of Tanzanian industrial development was laid during the period in which it was under foreign control. This political inheritance affected, first, the composition of output, consumption and trade. Secondly, it affected the specification of products, scale and location of production, and technology. These effects were of the type commonly associated with dependence and widely documented.[3]

The country's colonial experience was to some extent atypical. Before the First World War it was a German protectorate. After 1918 it became a League of Nations mandate under British administration rather than a colony. After the Second World War the British continued to administer the country as a United Nations trust territory. In 1961 it became independent and in 1964 joined with Zanzibar to form the United Republic of Tanzania.

Thus colonial penetration of the economy was limited in comparison, for example, with that of Kenya. Nevertheless, the pattern of economic development does not seem to have been fundamentally different from that of other developing countries.

With regard to the composition of trade, by 1911 the export sector had been developed, characteristically, around a range of primary products supplying German markets. These were principally (80 per cent), sisal, rubber, hides and skins, copra, coffee, cotton and gold [15]. Simultaneously with the emergence of production of cash crops for export and the shift of rural labour to the plantations, imported mass-produced manufactured goods started to erode the market for domestic manufactures.

The orientation of the economy towards primary exports and manufactured imports has remained substantially intact. At independence, in 1961, the composition of exports was dominated by unprocessed or partly processed primary products and it still is. In 1961, 50 per cent of wage employment was in the plantation sector producing sisal, coffee and cotton. Unprocessed raw materials and crops accounted for over 90 per cent of exports. Currently the export composition is the same, except that cloves from Zanzibar are included, and refined petroleum has been re-exported (to Zambia) since 1968. On the import side, manufactured

[3] For a recent example, see Leys [14].

consumer, intermediate and capital goods predominate, plus petroleum, which now contributes about 15 per cent to the total import bill. The composition of export trade is related to the composition of domestic output in the monetary sector, and to some extent also in the subsistence sector. The principal shift in emphasis, from sisal to coffee, has not changed the primary-product orientation of exports.

The erosion of markets for domestic cottage industry manufactures began around 1870. Research has produced evidence of flourishing spinning and weaving of locally grown cotton in various parts of Tanganyika [16]. Germans travelling through the country in the nineteenth century reported iron smelting and blacksmithy in various "industrial centres" that demonstrated skills comparable with those of pre-industrial Germany. Iron tools, chains, wire and weapons were produced with locally made equipment. Iron ore was mined in a number of places, and rudimentary blast-furnaces using wood, charcoal and limestone flux were functioning. By 1900, domestic production of cotton cloth and iron tools was all but extinguished because of inability to compete with imports. The quality of domestically produced cloth was poor, but iron hoes had been produced of reportedly superior quality to the imported products available around 1900. From then on Tanganyikan cotton was exported after ginning, to be reimported as finished cloth.

Spinning and weaving were not reintroduced into the country until 1960, when a 10-million-metre-capacity mill, financed by a consortium of local and foreign interests, was set up. Iron smelting has not as yet been reintroduced into the country; but local manufacture of iron hoes began again in 1970, when a farm implements plant was set up with Chinese aid. Ironically, the output of this plant over the first few years (up to 1 million units) was possibly lower than *per capita* output in 1880, when it was estimated that 150,000 hoes were passing through one market, Tabora, in the west [16].

The eradication of the cottage textile industry was complete, unlike that of India, for example, which survived severe pressure from British exports [17]. The Indian hand-loom sector currently accounts for about 30 per cent of total textile output, while attempts to revive the industry in the United Republic of Tanzania have been limited to the establishment of training centres. (Proposals have included, ironically, the introduction of the broadloom from the United Kingdom of Great Britain and Northern Ireland.)

The combined force of the expansion of plantation crops and the contraction of cottage industry, under pressure of the foreign trading system, must be conceived as one of the foundations of the subsequent evolution of economic structure and composition of output. This is reflected in the available data on the structure of GDP. The contribution of agriculture to GDP rose to something over 50 per cent, and in 1961 stood at 48 per cent. Subsequently the share declined to below 40 per cent, which was primarily due to the collapse of the sisal industry, which over three years caused the loss of about 60,000 plantation jobs (50 per cent of sisal employment). (In 1961, Tanganyika produced one third of world sisal output, and the industry as a whole accounted for 30 per cent of total wage employment.) The colonial powers who brought into being the export-dependent plantation economy also developed the cheaper substitute materials that undermined it. The collapse of the sisal industry resulted in almost zero wage employment growth in the country between 1962 (397,000 workers) and 1972 (403,000 workers).

Apart from agriculture, the other major sector was, characteristically, services. In 1961, at independence, finance, administration, hotels and distributive trades

accounted for 34 per cent of GDP (42 per cent if transport is included). Therefore, 90 per cent of GDP was accounted for by agriculture, services and transport [18]. This reflected, first, the orientation towards export cash crops, and, secondly, the inflated banking, trade and administrative system required to feed the foreign trade sector and colonial administrative apparatus. In 1977, these sectors, however, still accounted for 86 per cent of GNP [19], while manufacturing, crafts, power, mining and construction accounted for 14 per cent.

On the wage employment side, heavy orientation remains towards these two sectors, with transport and services accounting in 1977 for about 44 per cent, and public administration (community services) alone, recently the fastest growing sector, accounting for 25 per cent [19]. The continued emphasis on public administration has its origin in the colonial system, subsequently reinforced by more recent developments in the socialized public sector.

Returning to the foreign trade sector, we find that the import ratio changed from 25 per cent in 1966 to 34 per cent in 1975, and 27 per cent in 1976, a high level by international comparison [20], but typical of an open and dependent economy exporting primary products in return for manufactured goods. The export ratio, which was around 25 per cent throughout the 1960s, fell back to 20 per cent in 1976. The country's position as a producer of primary goods and importer of manufactured goods showed itself particularly vulnerable when domestic drought coincided with severe price inflation of imports, resulting in a trade deficit of 31 per cent of GDP in 1975.

The emergence of the modern industrial sector after 1946 followed a pattern of investment largely predetermined by the colonial economic system as regards composition of output, based on the one hand on local processing of exportable primary products, and on the other hand substitution for previously imported consumer goods. This pattern reflected, first, the existing nature of the external trade sector, and, secondly, the emerging pattern of consumption oriented towards the wealthier urban population (foreign and indigenous). In either case a high level of dependence on exports or imports was required, which reinforced the divergence of domestic resource use and domestic demand. To the extent that new factories substituted for existing cottage industry based on local resources (e.g., in furniture, shoes, garments and beverages), dependence on imports increased.[4]

In 1949, the composition of organized industrial output was largely determined by the predominance of cash crops and urban consumer goods. The first industrial survey of 1957 [21, 22] listed sisal processing; cotton ginning; sawmilling; vegetable oil extraction; tobacco curing; and manufacture of soap, leather, garments and furniture. Alongside these enterprises a depleted craft sector remained. Notable here was the increasing use of scrap material, based on discarded imported tires, tin cans, vehicle parts etc. This "degenerate" form of craft industry was involved in manufacturing sandals, lamps, spray guns and domestic utensils. Imported synthetics were increasingly used in footwear and garment manufacture. Thus the material base of the cottage sector was transformed in that it also depended on imports.

Between 1949 and 1961, the commodity composition of industry remained substantially unchanged; only the scale, location and pattern of ownership and control changed owing to the internationalization of investment. Apart from one large-scale, plantation-based sugar factory and a brewery, which had existed before

[4] Marsden has noted this phenomenon when bakeries and plastic footwear have been introduced [7].

1949, the period saw international interests setting up plants for the production of cola beverages, milled flour, canned fruit, dairy products, canned meat, paint, insecticide (mixing) and tin cans. All these plants directly supplied the export processing or consumer markets.

The economic and political forces that determined the composition of new industrial output also had considerable impact on technology. This was effected through their impact on location and scale of production, and also more directly through techniques introduced by capital-rich international companies. In the 1950s, the average manufacturing enterprise employed fewer than 40 workers. In 1961, despite the emergence of international investment, the industrial census still listed only 8 out of 700 manufacturing plants (as distinct from agro-processing) as employing more than 50 persons. However, development was confined to an enclave of exporting and importing largely at two ports, Dar es Salaam and Tanga. Four regions out of 18 accounted for 70 per cent of manufactured output. This process was typified by the location of the meat cannery at Dar es Salaam, some 400 miles from the cattle-raising areas, a location unsuited to the domestic market. With independence, the characteristic features of neo-colonial industrialization were reinforced with regard to scale, location and external dependence of production. From 1961 on, a clear dichotomy began to develop between older, small-scale processing plants and larger-scale plants set up by international investment.

Transnational investment reinforced the suppression of domestic linkages and promoted external dependency because this was consistent with the trade-expansion objectives of the transnational corporations.[5] Investment was made in a range of import substitution or export processing plants during the 1960s, including coffee, cigarettes, textiles, sisal products, truck assembly and radio assembly [24]. Some diversification into production of intermediate goods occurred with cement and petroleum refining. Foreign backers were from the Federal Republic of Germany, Italy, Japan, Netherlands, Switzerland and the United Kingdom. East African companies (e.g., Chandaria) established production of glass containers, aluminium products and matches.

In 1964, manufacturing still represented only about 4 per cent of GNP [25], somewhat less than in neighbouring Kenya. Of this, 80 per cent of output was in the export processing and consumer goods sectors. In 1965, the international average manufacturing ratio for small primary producer economies was 10 per cent, with 70 per cent of output in export processing and consumer goods [26].

A watershed in policy came in 1967 with the Arusha Declaration, which called for the nationalization of external trade, banking and several major industries, and a major drive towards rural collectivization. This policy, with its emphasis on self-reliance, socialization and public control at the national and local levels, had implications for both the composition of output and technology. A further declaration in 1973 formally confirmed the previously stated objective of switching towards labour-intensive, small-scale industry. Meanwhile, however, public-sector control had reinforced the tendency to engage in large-scale, capital-intensive production.

Between 1967 and 1975, the composition of industrial gross output was altered with the establishment in the public sector of a range of intermediate goods industries such as tires, steel products, chemical fertilizer and farm implements. Between 1964 and 1975, the share of consumer goods and export processing fell from 80 per cent

[5] A relevant discussion of multinational investment objectives appears in Kilby [23].

to 70 per cent of industrial output, and the overall manufacturing ratio rose to 10 per cent. Industrial output growth rates exceeded 10 per cent per annum [27]. By 1977, industry was a significant employer of labour in the wage sector, with 17 per cent of the total wage labour force. Import substitution had reduced imports of finished goods as a percentage of total supply of industrial products from 68 per cent in 1961 to 55 per cent in 1973. In the consumer goods sector, 30 per cent of finished goods was being imported in 1973, according to World Bank estimates.

The apparent advances in terms of structure and growth over the period 1961-1975 are, however, subject to several qualifications. While the intervention of the public sector resulted in control over the majority of investment in industry and a decisive shift to intermediate goods, these goods were highly dependent on imports. The ratio of imported inputs to industrial output grew steadily, particularly in the petroleum, steel, aluminium and metal products, tires and chemical fertilizer sectors. Industrial value added as a proportion of gross output declined from 32 per cent to 28 per cent, reinforcing the dependence on imports. At world prices it appeared at one stage that local value added in steel rolling was close to zero. The corollary was that domestic interindustry linkages were not established to any significant extent. One study [28] concluded that the intermediate goods industries were themselves export-import dependent, since 60 per cent of their output was purchased by the export-processing and import-substitution consumer goods sector. (The latter category included beer, soft drinks, furniture, radios and jewellery.)

The lack of interindustry linkages has meant that some of the production anomalies characteristic of underdevelopment and dependency have been perpetuated [29]. For example, the map of the mineral resources of the country was based on piecemeal surveys carried out largely by foreign firms looking for exportable minerals rather than domestically usable industrial materials. This is related to the fact that coal and iron ore, which were used in the nineteenth century, have since then been largely unexploited, although plans for their exploitation are now in hand. During the first phase of industrialization, industries such as cement were based on fuel oil. Urban and to some extent rural construction was developed on the basis of imported steel, aluminium, iron sheets, prefabricated concrete and glass. Bricks and tiles were hardly used except in isolated towns, villages and a few missions. Yet the raw materials for these products were widely available. The fertilizer plant was based on imported raw materials despite the known existence of potash and phosphate deposits. Ceramic products were entirely imported despite local deposits of kaolin, feldspar and other inputs.

Local production of aluminium and plastic utensils (import-based) has to some extent pre-empted exploitation of local materials. A glass-container plant, while using local beach sands, also imports soda ash, while a large soda ash mining project has been planned exclusively for export (to Japan). Until about 1975, a match factory imported wood splints, although located in a well-forested area. Pyrethrum has been exported and reimported as insecticide for local final processing. The drain through export of domestic raw materials from potential domestic processors has been especially obvious in the textiles (mentioned earlier) and leather industries.

This lack of integration has also resulted in waste. By-products such as molasses, rice and maize bran, cashew-nut-shell liquid, cotton and wood waste, coconut husks and scrap metal from steel rolling and fabrication plants have been lost.

Other technology-related variables in the pattern of industrial development also show characteristic behaviour. The geographical distribution of industry has, if

anything, become more skewed over time. In 1975, industrial production remained concentrated in Dar es Salaam and four other towns. Dar es Salaam, with 4 per cent of the country's population, accounted for 60 per cent of industrial output, and out of 20 regions with 38 per cent of the population accounted for 91 per cent of output [18, 28, 30]. This centralization has occurred not only because of the trend towards larger-scale plants and centralization, but also because of stagnation of small supply-based enterprises in the private sector such as soap, jaggery, sawmilling and sisal processing.

Increasing centralization has occurred not only in higher-technology industries, which might have been more susceptible to scale economies, but also in leather, shoes, food processing and sawmilling. A particular example is the establishment in 1975 of a $2.5 million semi-automatic bakery in Dar es Salaam (in competition with existing small bakeries), with the high capital cost per worker (2 shifts) of $40,000 in 1975.

The capital-intensity of production increased steadily over the period 1966-1976. However, the growth of industrial employment apparently kept pace with industrial output, rising from 42,780 in 1968 to 75,350 in 1976, because, since 1969, both labour productivity and capital productivity dropped, and thus the incremental capital-output ratio in industry rose rapidly, especially in the public sector. Employment kept pace with output growth only because of unsatisfactory output performance. The trend towards increasing cspital intensity can be seen more clearly from estimates of investment and electricity consumption per worker as shown in table 1.

Between 1966 and 1974 the scale of production in industry also increased steadily, as can be seen from table 2.

The contribution of the largest enterprises to both output and employment has risen steadily and rapidly while that of the smallest has declined correspondingly. Of the largest 21 enterprises in 1973, 12 were in Dar es Salaam, and these 12 alone accounted for 25 per cent of all manufacturing wage employment. The most highly concentrated industries were meat processing, beverages, tobacco, textiles, footwear, tires, cement, fertilizer and electrical appliances. Average employment per unit in the organized sector rose steadily from 86 in 1968 to 145 in 1976.

Outside the organized sector is a fairly extensive, if depleted, cottage sector. Data for this sector up to 1975 have never been satisfactorily collected. Efforts to collect such data in 1975 yielded a rather approximate estimate of 30 per cent of

Table 1. Industrial capital intensity, 1966-1976

Item	*1966*	*1967*	*1968*	*1969*	*1970*	*1971*	*1972*	*1973*	*1974*	*1975*	*1976*
Electricity use per worker (thousand kWh)	1.52	1.85	1.62	2.16	2.05	2.37	2.61	2.45	2.34	2.35	2.5
Depreciation per worker (thousand TSh)[a]	15.3	18.0	15.0	20.4	20.1	18.7	20.5	23.6	22.5		

Source: International Bank for Reconstruction and Development and *Tanzania Economic Survey 1977-8.*

[a] Constant prices.

Table 2. Plant size and industrial concentration, 1966-1974

Item	*1966*	*1968*	*1970*	*1971*	*1973*	*1974*
Number of registered enterprises	434	496	482	468	503	499
Enterprises employing 10-100 workers	346	408	340	348	362	350
Per cent of gross output	36	44	36	29	27	27
Per cent of employment	34	31	24	23	20.5	19
Enterprises employing 100-500 workers	83	74	98	105	120	127
Per cent of gross output	46	36	42	46	38	35
Per cent of employment	49	39	39	40	40	39
Enterprises employing 500 and more workers	9	12	14	15	21	22
Per cent of gross output	18	19	23	25	34	38
Per cent of employment	16	30	37	38	47	43

Source: Based on surveys of industrial production, 1965-1974 (Government of the United Republic of Tanzania).

total industrial output and 84 per cent of industrial employment (including seasonal labour) [29]. On that basis one could perhaps surmise that a polarization was developing between traditional craft industry at the one extreme and large-scale production at the other. Such a phenomenon has been recorded elsewhere, in, for example, the Philippines [31].

The decline of small factories was speeded up by the exit of sections of the Asian community that had previously owned such enterprises. The real growth rate of small-factory value added was about 3 per cent per annum between 1964 and 1975, compared with 13 per cent for large-scale industry.

The next problem confronting Tanzanian industrialization has been the perennial excess capacity, also associated with large-scale production and plants dependent on imports and/or exports. Excess capacity has occurred particularly in agro-based industries such as meat and fruit canning, kenaf, sawmilling and vegetable oil, but also in industries dependent on imports and export markets such as steel products and fertilizer. Cement production has also suffered considerable excess capacity. The principal reasons have been inadequate infrastructure and materials (for collection and transport), delay in receiving imports and market constraints. Steel products have been dependent on imported billets of a non-standard specification, and the 22,000-ton rolling mill has operated at below 50 per cent capacity because of both import supply bottle-necks and domestic market constraints. Fertilizer, cement and textiles have operated at below capacity at various times because of lack of spare parts, transport breakdowns and delays and shortages of materials, especially imported materials [28-32]. In 1974/75, some fruit canning plants were either closed or operating at something below 25 per cent capacity. In 1975, the meat cannery lost its British export market because of a minor change in processing regulations for slaughter-houses that the enterprise could not meet in the short term. This added to its location and supply problems and resulted in operation at well below 50 per cent of capacity.

A final problem of particular relevance to this discussion is the drain of profits through foreign investment, also directly linked to the external dependence of industries. If repatriation of profits is restricted and perceived investment risks are

high, alternative channels of foreign payment are activated, particularly technology payments with over-invoicing or under-invoicing, or transfer pricing [33]. Both of these practices have been prevalent in the United Republic of Tanzania according to some fairly recent research [24, 34], owing to external dependence and the widespread existence of joint venture and/or management agreements with transnationals. Such agreements applied in 1974 to textiles, diamonds, tires, coffee, radios, cigarettes, brewery, tin cans, cola beverages, fertilizer, cement, cashew nuts, leather tanning, bicycles and vehicle assembly. In all cases they were minority or majority foreign holdings or technical services agreements. Specific instances of transfer pricing were unearthed in the course of government monitoring of operations, in, for example, leather tanning and tin-can manufacture.

The above discussion has highlighted *(a)* trends in the composition of output and *(b)* factors directly affecting technology choice and the performance of large vis-à-vis small enterprises. In the light of the discussion some final points are relevant. The composition of industrial output has been dictated by forces that have prevented the formation of domestic linkages and encouraged export processing and import substituting consumer goods. This is particularly reflected in the weakness of engineering production. In 1974, the engineering and fabrication sector comprised about 9 per cent of industrial net output (including one farm implements factory, truck assembly and light engineering and repairs). Metal processing accounted for a further 3 per cent, consisting of a steel rolling mill, aluminium rolling and a handful of captive foundries attached to workshops. The combined contribution (bearing in mind the low local real value added in metals) was 12 per cent compared with an average figure of up to 20 per cent to other primary producer economies [26]. (See also tables 3 and 4.) The capital goods component of industrial production was inadequate as a base for indigenous technical development.

The goal of the third five-year plan was to effect a significant structural change in industry, based on large-scale public-sector investment and continuing centralization and increasing capital intensity of output [29]. At 1975 prices, the average (unweighted) capital cost per worker in industry was $18,000; and at the top end, paper milling, it was $100,000 per worker. These figures are to be compared with a probable total net domestic surplus (undiscounted) per economically active member of the population of a maximum of $1,000 over 1975-1995 (in 1975 prices).[6] Even given the very high investment ratios (20-22 per cent), achieved, under such circumstances a capital constraint is likely to be operative, and employment growth in industry over 1975-1977 started to drop well below historical rates of 10-12 per cent. This has been reinforced by an external payments deficit since 1974. Urban unemployment, which was estimated at 10 per cent in 1971 [35], as a result shows considerable likelihood of reaching significant proportions, with urban population growth of about 8 per cent. The overall manufacturing ratio between 1975 and 1977 levelled out at under 10 per cent, rather lower than average for primary producing countries and signifying that industry is no longer acting as an accelerator to economic growth. The third plan projected an 8 per cent annual growth rate up to 1995, but current indications are that it will not be achieved.

This discussion of Tanzanian industrialization has focused on *(a)* the commodity composition and *(b)* the scale and technology of industry. Eradication of domestic linkages and introduction of capital-intensive techniques were two principal features of the industrialization process. The Tanzanian economy in the nineteenth century

[6] Calculation based on third-five-year-plan projections (1975).

was able to produce, albeit at a low technical level, cotton cloth and iron tools, the tools and equipment to make these products, the equipment to make the tools and the basic material to make the equipment. In the twentieth century, by contrast, industry became oriented (albeit at higher technical level) either towards the first stages of production (mining and primary processing) or to the final stages (assembly and finishing operations) and was increasingly concentrated at external trade access points. The dominance of the public sector since 1967 seems to have aggravated certain tendencies, especially increased scale and capital intensity, while only altering superficially up to now the composition of output. Future plans for restructuring production appear likely further to increase industrial concentration, even though the political system was nominally decentralized to prevent that by providing a power structure giving weight to regional economic interests.

The lack of domestic linkages is particularly noticeable in the weakness of capital goods production, characteristic of most dependent developing countries; external dependence for all types of equipment carries with it technological dependency problems distinct from the others discussed.

In the absence of a viable capital goods sector, local technological research and development have not showed significant progress beyond sporadic efforts (e.g., village mechanization).[7] The phenomenon of marginalization of scientific research and development, noted by Cooper [36], is evidently applicable in the United Republic of Tanzania, and the transnational corporations that participate in the ownership and control of several State enterprises include some whose world monopolistic position in the technological field is well known.

The pattern of industrial development has been determined largely by changes in patterns of production, consumption and trade. The technology of production has in turn been closely influenced by these changes plus the extra factor of changing location and centralization of production, and orientation towards imported rather than domestically available raw materials and fuel. The political system underpinning this pattern was initially colonial; later on it was aided by transnational private investment; and, since 1967, it has become bureaucratic centralist (or perhaps State capitalist), during which time a large public sector has emerged.

Towards a strategy for technology and industrial transformation

From the foregoing analysis two conclusions may be suggested: *(a)* choice of technology has been bound up with forces influencing macroeconomic development, particularly through the composition of industrial output; *(b)* optimal technology choice for the long term would have to attach priorities to particular products or groups of products and to allocation of inputs if it is to conform to long-term strategy priorities. We have tried to argue these points from the macro-level, focusing on the historical breakdown of domestic interindustry linkages that affected output composition and input patterns (and scale and location of production).

The transformation of industrial structure (composition of output) is central, either as cause or effect, to the development of the sector. This may be ascertained from Chenery and Taylor's study of development patterns in rich and poor countries [26] (see table 3).

[7] For example, by the Tanzanian Agricultural Machinery Testing Unit at Arusha.

Table 3. International comparison of industrial structure, 1965

(Percentage of total output)

Industry	*Typical small primary producing country*	*Typical small industrialized country*
Food, beverages, tobacco	45.0	15.0
Textiles	13.0	8.0
Clothing, footwear	10.0	6.0
Wood products	5.0	5.5
Leather and leather products	0.2	0.8
Non-metallic mineral products	6.0	5.5
Rubber products	1.0	1.5
Paper and paper products	—	6.0
Printing, publishing	4.0	4.5
Chemicals, petroleum and coal products	7.0	9.3
Basic metals	—	6.0
Metal products and engineering	11.0	31.0
	100.0	100.0
Overall manufacturing share in GDP	10.2	32.2

Source: H. Chenery and L. Taylor, *Review of Economics and Statistics,* No. 50, November 1968.

The United Nations study cited below has shown that developing countries as a whole are currently undergoing structural shifts of this type. Table 4 shows this trend, with the United Republic of Tanzania's current position by comparison.

Table 4. Structure of industry in developing countries, 1960, 1970 and in the United Republic of Tanzania, 1975

(Percentage of total output)

	United Nations study		*United Republic of Tanzania*
Industry	*1960*	*1970*	*1975*
Food, beverages, tobacco	28.5	24.8	29.4
Textiles, allied	21.4	18.4	21.2
Wood, paper, printing	8.3	8.4	6.9
Chemicals, plastics, rubber	14.6	16.3	18.0
Non-metallic mineral products	5.2	5.7	4.2
Basic metals, engineering	19.4	24.1	17.8
Other	2.8	2.2	2.8
Total	100.0	100.0	100.0

Source: Based on *Industrial Development Survey* (United Nations publication, Sales No. 73.II.B.9); *Tanzania Economic Survey, 1977-8.*

Table 5 shows the broad trends of the industrial structure of the United Republic of Tanzania.

Table 5. Trends in industrial structure of the United Republic of Tanzania

(Percentage of total output)[a]

Type of goods	*1965*	*1969*	*1973*
Consumer	71.4 (56.2)	63.3 (59.2)	57.2 (58.9)
Intermediate	23.5 (39.6)	25.7 (30)	32.7 (33.1)
Capital	1.3 (2.7)	9.2 (10.1)	8.8 (6.9)

Source: Annual surveys of industrial production (Government of the United Republic of Tanzania).

[a] Value-added ratio in parentheses.

The data are inconsistent and do not agree with some cited earlier, but nevertheless demonstrate the comparative smallness of the capital goods sector and the growth of intermediates at the expense of consumer goods.

The estimates in all show the shift from primary processing and light industry to heavy industry at higher stages of industrialization. This shift has been established from time series as well as cross-section data. In 1975, Tanzanian industry, despite the structural change described, was clearly in category A. At the opposite extreme one may cite the contribution of Japan's metals and engineering sector to total output, about 52 per cent in 1975, while its food, drink and tobacco sector contributed 10 per cent [37]. It has been shown [38] that such structural changes have historically coincided with an increase in interindustry transactions. The highest measured interindustry linkages backwards and forwards occur in the following industries: basic metals, textiles, leather, paper, wood products, chemicals, petroleum, and food processing [24, 39]. Within a closed (dynamic) input-output matrix, engineering would also have high backward and forward linkages.

A pattern of investment to achieve a high level of domestic linkages would necessarily be planned around the above-mentioned group of basic commodities, including machinery production. Such a strategy was that prescribed for the Union of Soviet Socialist Republics (the so-called Feldman model) and for India (the Mahalanobis model). Its application to small primary producer economies such as the United Republic of Tanzania has been advocated more recently by Thomas [40]. Such strategies have their intellectual basis partly in the Marxist distinction between department I and department II commodities (capital goods and consumer goods).

The justification for singling out capital goods may depend on certain rather restrictive conditions prevailing in the economy [6]. The principal condition is that the capacity of production of the capital goods sector is the binding constraint on investment and growth, rather than the savings rate or absorptive capacity of the economy. This is only likely to be the case with severe limitations on trade (or very low foreign trade elasticities) such as in the Soviet Union in the 1920s and 1930s.

However, spare parts shortages are a frequent constraint in many countries that prevent the full utilization of capacity. If capital goods production is also regarded as embodying technical progress, then emphasis on the capital goods sector may yield

special benefits of adaptive technical advance, which are available to capital goods producers only. The peculiar benefits to the economy arising from indigenous production of machinery arise from its high interdependence with other industries and apparent inducement and innovation effects. Strassman [41, 42] has analysed innovation potential as a function of the proportion of its input or output that a purchasing or supplying industry buys from or sells to an innovating industry. High linkages mean a high coefficient of technological transmission. As an economy develops domestic linkages a given increase in final demand generates higher levels of interindustry demand and higher innovative effects. Technical progress embodied or disembodied has been credited with a major contribution to the growth of output per head [43].

Thomas [40] proposes a basic-industry strategy to integrate use of domestic resources with domestic demand as a principal element in the strategy for transforming small primary producer economies. The principal reason for this is to prevent surplus drains arising from an unequal exchange in trade and low income elasticities of demand for primary commodities; a classic example is the case of the Tanzanian sisal industry. The complementary factor is the drain of the surplus through technology payments and transfer pricing discussed above. Under these conditions it would be expected that a basic-industry strategy would yield a higher rate of domestically retained surplus than a strategy based on primary processing and permit faster growth. This is particularly the case if simultaneous planned development of the sector occurred that permitted the most rapid possible development of intermediate goods markets and most rapid possible attainment of scale economies. Similarly, generation of local technical progress may be expected to lead either to high rates of surplus or to lower capital-output ratios in industry, permitting faster growth.

Such a strategy would imply both a quantitative and qualitative shift in development strategy as a whole. The required pattern of investment may be determined by reference to the type of information contained in table 3. Even assuming that these data are not necessarily prescriptive, they suggest the desirable direction of change. Investment reallocation within industry would be designed to achieve a balance of capital, intermediate and consumer goods, with a medium-term to long-term target for production of capital goods as a proportion of industrial output. In the long-term strategy of the United Republic of Tanzania, metal and engineering industries are expected to account for 30 per cent of output by 1995.

To determine a desirable overall pattern of investment is one of the two objectives of our strategy. The second is to determine the optimal set of production techniques. It would follow from the conclusion of the above discussion that the question is not whether industrialization should be capital intensive or labour intensive because the efficient use of resource inputs is only one criterion for identifying appropriate technology. The other criterion is appropriate composition of output. Maximization of long-run output and employment would be a function of the structure of production as well as the choice of inputs in industry. If a balanced industrial strategy is the best approach to long-term growth, then the key issue for technology policy is the choice of appropriate technology in the basic and capital goods industries.

A basic-industry strategy for small economies carries with it, however, the serious problem that such industries are particularly susceptible to economies of large-scale production and are highly capital intensive. This applies particularly to

petroleum and coal products, non-ferrous metals, iron and steel, non-metallic mineral products and chemicals [24, 44-46]. Furthermore, the "minimum economic scale" in many industries increases rapidly with innovation, and these industries are among those in which research and development are concentrated. Pratten estimates that oil-refining cost per ton falls by 60 per cent between 1 million and 20 million tons annual capacity. In synthetic fibres, costs at 40,000 tons capacity are 20 per cent below those at 4,000 tons. Steel production costs at 6.5 million tons are 10-18 per cent below those at 2.2 million tons. Pack [47] estimates that capital per man employed in textiles increased between 1950 and 1968 by a factor of 15-20.

Table 6, based on a Japanese study [48] shows the relationship between scale and capital intensity.

Table 6. Capital intensity and capital coefficients by size of manufacturing firm (Japan, 1957)

Size of unit (employees)	*Number of firms*	*Capital/labour (thousand yens)*	*Capital/value added (thousand yens)*
1-10	300 374	69	0.371
10-50	90 766	85 (group average)	0.265 (group average)
50-100	8 460	120	0.285
100-500	4 772	228 (group average)	0.384 (group average)
500-1 000	441	408	0.523
1 000-1 999	222	589	0.64

Source: B. F. Hoselitz, ed., *The Role of Small Scale Industry in the Process of Economic Growth* (The Hague, Mouton, 1968).

The data show a direct relationship between scale and capital intensity from the 10-worker level upwards. The data on capital coefficients, however, show that the smallest enterprises are the least efficient users of capital. This finding has been confirmed elsewhere; for example, in the ILO study on the Philippines [31].

Given the apparent need to build large-scale plants and the scarcity of savings relative to the investment required in such industries (see above on the Tanzanian third five-year plan) and the foreign-exchange constraint, the scope for a basic-industry strategy would therefore appear limited.[8] Thomas [40] argues that a "minimum optimum scale" would be a realistic objective for small economies, based on standard technology. However, the recognized minimum economic scale in, for example, steel production (using an electric-arc furnace) is about 250,000 tons per annum, which would cost upwards of $300 million in capital investment. A current proposal to establish a mini steel plant of 50,000 tons capacity in Nepal is expected to cost $95 million, including infrastructure, and its feasibility is doubtful. Such sums are not readily available to small primary producer economies. A recent study [49] estimated that in the United Republic of Tanzania the rapid sequential

[8] The study *Small-scale Industry in Latin America* (United Nations publication, Sales No. 69.II.B.37) specifically excludes cement, fertilizer, paper and glass from small-industry programmes.

establishment of basic industries would in all cases except food processing result in a short-term reduction in the rate of growth of output (and employment), which would aggravate the shortage of savings and foreign exchange; consequently, in a basic-industry strategy, economic-efficiency objectives might have to be ruled out. The small domestic market would also act as a constraint on establishing efficient units in the absence of export opportunities and simultaneously expanding the production of interrelated intermediate goods. The imposition of one or other of these constraints—savings, foreign exchange or market—has in practice provided the justification for concentrating on the development of light industry in most developing countries.

Despite these constraints, there are several reasons why scale economies based on engineering estimates may not be readily attainable in developing countries. First, factory prices even in distorted markets are generally more favourable to small-scale, labour-intensive techniques. Secondly, scale diseconomies may operate, some of which have been cited in relation to the United Republic of Tanzania. For example, infrastructural gaps are frequent, e.g., lack of capacity of power transport and port facilities to handle lumpy increases in investment. (The Tanzania fertilizer factory, which cost $25 million in 1971, required a purpose-built jetty, which increased basic cost by 25 per cent. Subsequently, capacity utilization was reduced by continuous shortages of rolling stock, water and materials.) Further instances of failure in infrastructure, supplies and maintenance were mentioned previously. Thirdly, large-scale plants, because of the higher likelihood that finance, management and materials will be imported, may be more prone to the various surplus drains, so that rates of profit are reduced. The classic example of surplus drain via technology payments and transfer pricing is in the pharmaceutical industry, studied by Vaitsos [33].

Fourthly, small-scale plants enjoy certain advantages. These include reduction in transport costs where the geographical spread of the market is restricted. This is especially true for heavy goods of low value, goods such as bricks, cement and timber, or perishables such as fruits and vegetables. Small plants may also be able to derive an advantage from using scattered, small deposits of raw materials unworkable economically on a large scale. Scrap materials in developing countries are probably more easily recycled through small plants. Many small chemical plants were reportedly constructed in China in 1958/59 with the use of scrap material [50]. Small-scale production is also appropriate for specialized custom-made products and services, as evidenced by the continuing 20-30 per cent share of small enterprises in output in Japan, United Kingdom and United States of America.

Small-plant economics are affected by the general location of supplies and markets. A decentralized integrated economy (with a degree of regional self-sufficiency) such as that of China, where provincial and country-level production has been oriented primarily to local needs [51], is likely to permit viable small plants to be established. If such a socio-economic structure is accompanied by a redistribution of income towards the poor, with an expansion in demand for lower quality or less highly refined goods, including consumption goods and rural construction materials, then smaller-scale, less capital-intensive techniques are also likely to be appropriate [12, 52].

Another way of introducing small-scale plants, related to the previous one, is through flexibility in the use of materials. Some materials requiring low capital-intensity production techniques and a small scale of production may act as

substitutes especially where investment and consumption are oriented towards unsophisticated products. This applies, for example, particularly to building materials (e.g., bricks and lime can be substituted for cement, steel) and in fuels (coal, charcoal can be substituted for diesel).

In rural areas demand for clothing and footwear made of synthetics is likely to be limited. In addition, ceramic and earthenware may be economically substituted for plastic products (pipes, containers, domestic-ware etc.).

These points suggest that a development strategy designed to promote domestic integration by forging interindustry linkages, accompanied by corresponding changes in the social structure, may itself create an environment in which small plants are economic, at least over a transitional period.

In the United Republic of Tanzania, as can be inferred from the data of table 2, despite its stagnation over the period 1966-1974, the small-industry sector showed consistently higher gross output per head than the largest enterprises. This is partly because the small- and large-industry sectors included different industries and were thus not strictly comparable; in particular, textile spinning and weaving fell exclusively into the large-scale category. Large-scale industry over this period was also undergoing teething troubles. Nevertheless, assuming that the ratio of value added to gross output was similar for small- and large-scale production, labour productivity in small plants was higher. Since capital productivity was probably also higher, small plants maintained a competitive position. Statistics from other countries do not suggest such a clean-cut conclusion, but it is a general finding that for small enterprises employing more than 10 workers capital-output ratios are lower than for larger units. For enterprises employing fewer than 10 workers, this is not so, however (see table 4);[9] as a result, craft industry is thought to have limited prospects unless it becomes mechanized. (This conclusion applies to handicraft production for domestic consumption, not to production for export and tourist markets.)

Basic industry, particularly in China and India, has been established on a small-scale basis. It has included chemicals, fertilizer, cement, paper and paper products, a range of food processing industries, textiles, leather, engineering and metal products. Experiments at the Regional Research Laboratory at Jorhat, India, on small-scale cement production showed promising results, and more than 100 mini cement plants are being set up using vertical-kiln technology. In the Indian textile sector handloom or small-scale power loom weaving has accounted for more than 50 per cent of output. The Chinese have promoted the small-scale sector as a means of recentralizing the economy and achieving local self-sufficiency [51, 54]. Over 50 per cent of the nitrate and phosphate fertilizer produced has been produced in plants of under 10,000 tons capacity (compared with a standard assumption of economic scale of 200,000 tons or more). Fifty per cent of the cement produced is produced in plants of under 30,000 tons annual capacity (compared with a standard economic scale of 300,000 tons or more) [54, 55]. However, in 1973, China ordered several large ammonia-urea plants, and there are indications of a shift in policy away from the initial self-reliance approach of the 1960s. It is, however, not possible as yet to assess the prospects for mini basic industries.

Despite such cases, in certain heavy industries the threshold of capital cost for developing countries is formidable. Among these are petroleum and coal products, steel and non-ferrous metal processing, and petrochemicals. Motor vehicles are also

[9] See *Sharing in Development* [31] where this finding is supported. Dhar and Lydall [53] come to a different conclusion, however.

subject to high economies of scale. However, assembly plants have in fact been established throughout the developing world, usually on a highly inefficient basis. A greater variety of choice of technology is possible in light industries than in heavy industries. In a ranking of industries according to their capital intensity, light industry would generally appear in the lower half of the range [24, 56]. Leather tanning and wood products industries are at the least capital-intensive end, while some food processing (e.g., grain milling) appears half way up. Considerable progress has, however, been made in India in developing small-scale production for sugar, vegetable oil, fruit and vegetable processing and other food industries. Mini maize mills are extensively used in Africa and mini rice mills in Asia.

Indian statistics [57] show that the share of output of registered small industries is highest in industries such as fruit and vegetable canning (60 per cent), and other foods including grain, oil, sugar (60 per cent). The small-industry share of output is also high in textiles (30 per cent in handloom and 20 per cent in small power loom plants) [58], garments (over 70 per cent), textile goods (reserved for the small-scale sector only), knitwear (95 per cent), tanning (79 per cent), leather products (83 per cent), sawmilling (75 per cent). Small-scale furniture and shoe production account for 49 per cent and 43 per cent, respectively, a share that would no doubt be much higher if unregistered industries were taken into account. The average share of the registered small-scale sector is about 33 per cent. The lowest small-sector shares are, predictably, in chemicals, steel, cement, non-electrical machinery and vehicles (all below 20 per cent). Particular importance attaches to the engineering industry. The economies of the industry suggest that large-scale production is not necessary for viability. In terms of physical capital intensity, machinery manufacture is not in the upper end of the range. The specialized nature of production does not lend itself to long runs except for simple components and some other mass-produced goods such as containers, machinery casings and vehicle bodies. The principal condition according to Rosenberg [42] is a market large enough to permit specialization. In small primary producer economies, the domestic market is limited both by small existing capital stock and few possibilities for investment. In such countries specialization in a limited range of standardized equipment seems desirable.

In this sector the Chinese experience is once again instructive. Reportedly engineering is decentralized, with heavy machinery the responsibility of the State and repair shops the responsibility of brigades. Small diesel engines and pumps are manufactured at the county level (current average population 400,000). Tractor maintenance and repair, light engineering and fabrication are carried out in local factories in communes (population 10,000-20,000). Innovation efforts are actively encouraged locally.

In India, light engineering forms a main element in the ancillary industry programme, based on a network of over 400 industrial estates. Industrial statistics [57] show that the small-scale sector accounts for a high share of production in the following industries (per cent): metal products, 50 or more; vehicle repairs, 91, and electrical machinery, 33. By comparison, the engineering industry in the United Kingdom, according to Pratten [44], in 1971 consisted predominantly of medium-scale plants (average 400 workers).

In Japan, transport equipment and fabricated metal products are among the most highly subcontracted industries. The history of sewing machine manufacture is also a good example of specialization through subcontracting to small enterprises [58]. In this industry, between 1950 and 1969, production increased from

0.25 million units to 4.8 million units through specialization and standardization of components. The average number of parts produced by each enterprise fell between 1941 and 1963 from 60 to 3.

From the above evidence it seems fair to conclude that apart from heavy machinery production, involving, for example, the machining of heavy castings, there appears to be considerable scope for developing engineering in small developing economies such as the United Republic of Tanzania in both component and subassembly manufacture, light-to-medium engineering and assembly work, provided that careful standardization for the local market is adhered to. Consequently, technical innovation could take place indigenously, given an industrial structure with internal linkages. Thus, a basic-industry strategy may be suitable for an economy such as that of the United Republic of Tanzania. Heavy industries (petroleum, steel, chemicals, vehicles, heavy engineering) would be centralized to attain whatever economies of scale were feasible. For a second important group of industries a wider choice of technology and scale is possible. These industries could be decentralized. This second group could include heavy industries such as cement, chemical fertilizer, certain types of paper, and a wide range of light industries and engineering production. In this way a dual programme comprising a medium-to-large-scale heavy-industry sector and a small-to-medium-scale relatively labour-intensive industry sector could be established. The first sector, while possibly inefficient in terms of current factor endowment, would be justified because it would transform the composition of output. The second sector would be relatively resource-efficient in static terms, achieving objectives of allocative efficiency and others such as redistribution of income and regional balance. Both sectors combined would be designed to transform output and form domestic linkages and to raise economic efficiency.

The actual allocation of investment and production among sectors and between regions and centre, industry by industry, requires detailed investigation. The decentralized "efficiency" programme would incorporate cottage and small enterprises in "traditional" light industry and some basic-industry production, possibly in cement, fertilizer, engineering and paper. The centralized "transformation" programme would incorporate heavy industry and certain light industries where economies of scale are attainable.

Choice of technology in a strategy for industrial transformation—conclusions

In the first part of this paper, the discussion of the industrial development of the United Republic of Tanzania illustrated the interrelationship between macro political and economic forces, composition of industrial output and choice of technology. In the process the discussion focused on the pattern of ownership and control of production, direction and composition of trade, and changing composition of output resulting from changes in political control. Technology was affected by composition of output (e.g., the advent of the import substitution regime resulted in the expansion of large-scale production), and also by the location of production, which in many cases dictated the size of accessible markets and feasible scale of production. In the second part of the paper some of the details of a technology and industrial-transformation strategy were sketched, with emphasis on basic industries

and the contribution that appropriate technology might be expected to make in the basic-industry sector, particularly engineering.

All the various parameters of economic development are interrelated; it is not necessary to assume that choice of technology is dictated by the composition of output and that the composition of output is dictated by the aggregate political and economic system. The point is simply that by identifying such relationships between micro-choice and the aggregate system certain insights can be gained. One of these may well be that standard methods of evaluating techniques at the plant or industry level are deficient because they cannot in practice incorporate or quantify external effects that would justify giving priority to certain products over others in a manner consistent with the requirements of national long-term strategy. This may be particularly the case with the products of the engineering industry whose priority within the strategy arises largely from its external (linkage) effects.

The choice of appropriate technology, e.g., labour-intensive technology, cannot be divorced from choice of an appropriate industrial strategy (planned composition of output) because, first, the objectives to be achieved by choosing appropriate technology cannot be divorced from those of industrialization as a whole, i.e., long-term economic growth, and, secondly, because choice of technology is in any case bound up historically with the composition of output and with aggregate economic forces dictating the actual composition of output. Therefore, promotion of appropriate techniques in isolation from macro-strategy may be frustrated. The key issue appears to be the decision on strategy. A strategy of industrial transformation involves the development of a group of basic industries. Consequently, the critical issue is whether appropriate (labour-intensive and small-scale) techniques are available within this particular group of industries.

Since 1950, developing countries have diversified their industrial sectors by establishing basic industry and moving away from colonial-type export processing or neo-colonial import substitution. This diversification has, however, been carried out, in the United Republic of Tanzania and elsewhere, largely by establishing large-scale plants of very high capital intensity. Furthermore, some of this diversification has been illusory because intermediate and capital goods projects depend heavily on imports largely because of their high level of mechanization and highly specified raw material requirements—both functions of capital-intensive technology. Many private companies in industrialized countries still view international investment primarily as a means of establishing protected overseas markets and not as a means of developing the recipient economy's indigenous resources for local industry. In such circumstances simpler labour-intensive technology that could be developed and supervised locally would be of prime importance, particularly in the basic-industry group.

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Income distribution by size, structure of the economy and employment: a comparative study of four Asian countries

*Felix Paukert, Jiri Skolka and Jef Maton**

Post-war economic growth in most developing countries has been quite successful in terms of an increase in GDP, but often has contributed little to reducing unemployment and to raising the income of the poor.

Various aspects of this problem were studied within the framework of the World Employment Programme launched by the International Labour Office 10 years ago. This paper contains results of four case-studies that were part of the research on income distribution and employment.[1] A feature these studies have in common is the application of a semi-closed input-output model, which permitted (under certain assumptions) the quantification of the interrelation between changes in distribution among households by size of income, the structure of the economy and the level of employment.[2] The calculations were carried out for four Asian developing countries: Iran, Malaysia, the Philippines and the Republic of Korea.

Links between employment and changes in the distribution of income

The purpose of the investigation carried out for the four countries was to obtain quantitative information on the interrelationship between hypothetical changes in the actual distribution of household income by size and level of employment. The link between these two variables was described in a static semi-closed input-output model. In the model, hypothetical changes in the actual distribution of household income by size were first translated into changes in the pattern and level of private household expenditure (while public consumption, fixed capital formation and exports were held constant).

Changes in the distribution of income affect the pattern of private consumption in the following three ways:

(a) A change in the distribution of household income by size of income affects total household savings. Although there is no general agreement on the most

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[1] See Paukert, Skolka and Maton [1]; Skolka and Garzuel [2, 3] and Maton and Garzuel [4].

[2] The authors wish to acknowledge, with thanks, Michel Garzuel's participation in the various case-studies.

appropriate macroeconomic savings function for the developing countries,[3] the available evidence shows that the rich have a greater propensity to save than the poor. Progressive redistribution of income in favour of the poor thus reduces the income-savings ratio and increases the share of private consumption in total household income;

(b) A change in the distribution of household income by size of income affects the structure of private consumer expenditures in two ways. One effect results from differences in the pattern of private consumption at different income levels, e.g., if the share of consumption of more labour-intensive products such as food, textiles, clothing and footwear is higher in lower-income groups. Thus, such a shift in the structure of household demand can increase employment. This increase, however, can be partially outweighed by a relative reduction of demand for labour-intensive private services, which are consumed more by the rich. The other effect may be due to higher consumption of imported products (e.g., durables) by the rich. Progressive redistribution of income may increase the demand for domestically produced goods at the expense of imports, and this effect may be strengthened by the shift in demand in favour of more labour-intensive goods, which may require fewer imported intermediate inputs. However, if a developing country imports large quantities of food because of low agricultural productivity, such import-substitution effects of the progressive income redistribution may be cancelled by higher imports of food for the poor;[4]

(c) The increase in total domestic output due to progressive redistribution of income can have a multiplier effect. The increase in total output leads to a rise in total personal income and, correspondingly, in total private demand, which brings a new stimulus for higher output.

The chain of interrelations can thus be summarized as follows: the consequence of progressive redistribution of household income is the increase in total private consumption, i.e., in private consumption of domestically produced goods and in labour-intensive products. This means higher gross domestic output which, in turn, has a certain positive feedback (multiplier) effect and brings more employment. A static input-output model does not permit the analysis of either the medium- and long-term dynamic effects of the decrease in the household savings ratio, or likely effects of the increase in corporate savings owing to better utilization of capacities and economies of scale, or of the increase in the tax revenue owing to the increase in total output. The impact of the first effect on employment is probably negative, the impact of the other two probably positive.

A hypothetical redistribution of income can be defined in several ways, but in any solution the following three sets of variables have always to be considered:

1. Distribution of primary personal income (e.g., of wages, salaries and income of self-employed by industry and income bracket);
2. Distribution of household income by size;
3. Network of the links ("mapping") between the distribution of primary income by industry and income bracket and the distribution of household income by size.

[3] See Mikesell and Zinser [5].

[4] See Weisskoff [6].

In the analysis of the consequences of income redistribution one set can be assumed constant. Another set can be changed exogenously. Changes in the third set are endogenous. Out of the six possible combinations, those marked *a*, *b* and *c* are of particular interest:

	a	*b*	*c*
1. Distribution of primary income	Constant	Exogenous	Constant
2. Distribution of household income by size	Exogenous	Endogenous	Endogenous
3. Mapping of the primary and household income	Endogenous	Constant	Exogenous

These three alternative solutions can be briefly described as follows:

(a) Imposition of stipulated income distribution patterns. Stipulated household income distribution patterns are exogenously determined. Distribution of primary income by income bracket and by industry is assumed constant. The links between the distribution of the primary and the household income are endogenous (but their changes need not always be specified—as in the model used in this study);

(b) Changes in the distribution of primary income. Changes in the distribution of primary and household income are exogenous. The link between the distribution of primary and household income is assumed constant. Changes in the distribution of household income are endogenous.[5]

(c) Changes in the links between the distribution of primary and household income. Changes in the links between the distribution of primary and household income (e.g., changes in taxation or in transfers towards households) are exogenous. Distribution of primary income is assumed constant; changes in the distribution of household income are endogenous.

The first solution was used in the four country studies carried out within the framework of the ILO research, to a large extent for statistical reasons.

The likely effects of the stipulated income distribution patterns were analysed with the help of a semi-closed static input-output model the logical structure of which is described below.

A stipulated income distribution by size (i.e., by deciles of total number of families), different from the actual distribution, is exogenously determined. The impact of the stipulated income redistribution on the volume and pattern of private consumption is calculated. For the new private consumption one obtains the corresponding volume and pattern of gross output, gross value added, personal income, intermediate and direct imports, employment levels and savings.

The input-output model was defined in two versions. In the first, simpler one, the solution was obtained by a single matrix inversion; in the second, by iterations. The model depicts the equilibrium state of the economy under alternative distribution patterns and shows in particular the impact of the hypothetical income redistribution on the level of employment.

[5] This method was tested in the study on the Philippines. See also Thorbecke and Sengupta [7] and Miyazawa [8].

The whole exercise is carried out under certain assumptions, which should be kept in mind when interpreting the results.[6] The most important assumptions are the following: Leontief's linear homogeneous production functions, free labour force resources and no capacity limitations, no economies of scale and constant returns to scale, constant volume of final uses other than private consumption (i.e., constant volume of public consumption, gross fixed capital formation, changes in stocks and exports) and no balance-of-payments limitations. Also fixed prices and wage-rates are assumed, but changes in the total volume of production, of imports and in the volume of total income are allowed.

The model[7] used can be mathematically defined as:

$$B \cdot Z = D \tag{1}$$

where

B = a square matrix of model parameters
Z = a column vector of the endogenous variables
D = a column vector of the exogenous variables

The solution of the simple version of the model (version I) is obtained by a matrix inversion:

$$Z = B^{-1} D \tag{2}$$

A detailed description of the model was given in the paper presented to the Sixth International Conference on Input-Output Techniques in 1974 [1]. Later on, an iterative version (version II) of the model was developed[8] in which the calculations continue after the matrix inversion defined by (2). Since the vector of endogenous variables Z provides, *inter alia*, the value of total personal income, this value can be inserted into the calculation of absolute income levels by deciles. The new averages for household incomes by deciles are compared with those used at the start. If the average income per household corresponds to that of another decile of the actual (base) income distribution, the relevant pattern of private consumption and relevant savings ratio are used in the next stage of the calculations. Iterations continue until full correspondence between the average income per household by deciles and vectors of consumption and savings coefficients is established.

[6] The model belongs to the family of models, the weaknesses and advantages of which were characterized by Morawetz in the following way: "Studies like these have a number of weaknesses. Generally little attention is paid to the way in which the initial income redistribution is to be achieved; it must surely be significant for final factor use patterns whether it is by capital or income transfers, or by indirect taxation. In a number of cases a simplistic two factor model is used. Aggregate consumption and savings data are notoriously unreliable in developing countries, not to speak of data on sectoral demand patterns and elasticities, income distribution, and future foreign capital flows. Government savings are not always treated explicitly. The use of fixed coefficient input-output tables involves assuming that technology does not change over time . . . Input-output data are frequently derived only from firms of a certain minimum size; firms smaller than this minimum may well use different technologies and may produce significant and changing share of total output." Nevertheless, Morawetz concludes that "Even if they are highly imperfect, macroeconomic studies provide the only currently available means of investigating the recently fashionable claim that redistribution of income in favour of the poor is likely to increase total employment." [9], pp. 504-505.

[7] The earliest version of the model was described in Paukert and Skolka [10].

[8] This approach was used in the study on the Philippines (IIa). In the studies for Iran and the Republic of Korea, each decile was further subdivided into 10 subintervals (IIb). Version II was not applied to Malaysia.

The model is a semi-closed input-output model; input-output tables provide the consistency framework for all data used. Input-output tables that were used contain in the first (intermediate deliveries) and second (final uses) quadrants flows of domestically produced goods. At the bottom of both quadrants there is a row of imported intermediate inputs by industries and of direct imports by components of final uses. Final uses have been aggregated into private consumption and other final uses (the latter include government expenditure, fixed capital formation, changes in stocks and exports). The vector of other final uses is constant. Private consumption is disaggregated by 10 income groups, the consumption (and savings) coefficients are part of the matrix B. Some changes were also made in the breakdown of gross value added. Instead of the usual breakdown into depreciation, gross fixed capital consumption, compensation of employees, indirect taxes less subsidies and other income, the breakdown always included a separate row of personal income (i.e., compensation of employees and income of self-employed). To study the effect of income redistribution on employment, the input-output data were complemented by data on employment by industry.

The industry classification of the input-output tables used in the four studies differs; it was not possible to establish a unified classification scheme. The reason was less a lack of comparability of the input-output tables than differences in the breakdown of data on private consumption and on employment. The most detailed classification was used in the study on the Philippines; it included 64 industries. Classification by 60 industries was used in the study on Malaysia, by 33 industries in the study on the Republic of Korea and by 29 industries in the study on Iran. Input-output tables for 1965 were used for Iran and the Philippines, a 1970 table for Malaysia and the Republic of Korea.

Economic situation of the four countries

The relationship between the size distribution of income, employment and structure of the economy was investigated for Iran, Malaysia, Philippines and the Republic of Korea. These are small or medium-sized countries at different levels of economic development which, in the last two or three decades, have followed different development strategies. Their endowment with natural resources and their climatic conditions differ. All four countries are developing market economies. The main reason why these countries were selected for the research was the availability of statistical data. All have a recent input-output table with information on domestic and imported flows, data on household income distribution by size, data on the pattern of private consumption expenditure and household savings by income decile and data on employment by industry.

Basic statistical indicators on the four countries are presented in table 1. In 1970, the population was around 30 million in three countries and around 11 million in one. The population growth rate between 1960 and 1970 was high, varying between 2.6 and 3.1 per cent. GDP *per capita* in 1970 was above $200 in two countries and at the level of $380 in the other two. The annual rates of growth of GDP *per capita* in the period 1960-1970 varied between 2.9 to 6.8 per cent. The average share of agriculture in GDP in the period 1965-1973 was over 30 per cent in three countries, but only around 18 per cent in the fourth (in that it was outweighed by the high share of mining). The average share of manufacturing was around 13 per cent in two countries and around 20 per cent in the other two.

Table 1. Basic indicators for the four countries

Indicator	*Iran*	*Malaysia*	*Philippines*	*Republic of Korea*
Population (1 000, mid-1970)	28 662	10 945	36 850	31 793
Population growth rate (%, 1960-1970)	2.9	3.1	3.0	2.6
GDP *per capita* ($, 1970)	380	380	210	250
GDP *per capita* growth rate (%, 1960-1970)	5.4	3.1	2.9	6.8
Average share in GDP at current factor cost (%, 1965-1973):				
Agriculture	17.9	31.4	35.7	31.6
Mining	27.4	6.1	2.1	1.3
Manufacturing	13.0	13.0	19.1	20.4

Source: *World Bank Atlas 1972* and *World Tables 1976* (Washington, D.C., World Bank).

Stipulated alternatives of income distribution

The purpose of the calculations was to quantify the effect of hypothetical changes in the income distribution on the level of employment and on other indicators of economic activity. Altogether 31 stipulated alternatives of income distribution by size of household were considered in the four studies, some corresponding to actual income distribution in certain countries, some purely hypothetical.

Table 2 contains information on 17 stipulated alternatives of income redistribution for which the results of calculations will be presented; some were used in all four country studies, some in one study only. They are ranked by the values of the Gini-coefficients, proceeding from the most uneven income distribution to the most egalitarian one. The last four columns of the table indicate in which country study the particular stipulated income distribution was applied.

Some of the income distribution patterns have specific meanings. Alternative 3 reflects the income distribution in the Philippines in 1965, alternative 4 the income distribution in the same country in 1971. Alternative 1 reflects the income distribution in Iran in 1965, alternative 12 the income distribution in the Republic of Korea in 1971, alternative 2 the income distribution in Malaysia in 1970. Alternative 15 simulates the distribution in Australia in 1966-1967 [11]. Alternative 5 is based on the income distribution in the Philippines in 1965 in which a floor of 1,000 pesos is introduced; it results in increasing the share of the lowest two deciles at the expense of the share of the highest decile. Alternative 10 represents the minimum floor for Malaysia. Some alternatives for the Philippines (5, 13 and 17) and for Malaysia (6, 11 and 16) are based on a proposal by Lubell [12], which consists of a reduction by a given percentage of the range between the arithmetic average of each decile and the arithmetic average of total population. Alternatives 5 and 6 reduce the range by 10 per cent, alternatives 11 and 13 by 20 per cent, and alternatives 16 and 17 by 50 per cent. The few remaining alternatives are arbitrary and are designed to provide information about the different degrees of inequality between alternative 1 and the most radical redistribution (Lubell's 50 per cent for the Philippines in alternative 17).

Table 2. Stipulated alternatives of income redistribution

(Percentage)

Alternative	Share of deciles in total personal income											Used in the country study on			
	1	2	3	4	5	6	7	8	9	10	Gini-coefficient	Iran	Malaysia	Philippines	Republic of Korea
1	1.27	2.35	3.13	3.85	5.16	6.27	8.20	10.97	16.39	42.41	0.522	X	X		X
2	1.18	2.76	3.25	4.53	5.52	6.80	9.06	10.74	15.08	41.08	0.499		X		
3	1.15	2.05	3.60	4.20	6.80	7.20	8.90	11.30	14.20	40.60	0.493	X	X	X	X
4	1.28	2.45	3.47	5.00	5.60	7.30	9.70	12.00	17.20	36.00	0.474	X	X	X	X
5	2.63	2.63	3.60	4.20	6.80	7.20	8.90	11.30	14.20	38.54	0.457			X	
6	2.08	3.52	3.88	5.05	5.95	7.12	9.19	10.63	14.59	37.99	0.448		X		
7	2.00	2.50	4.00	5.00	7.00	9.00	11.00	13.00	17.00	29.50	0.414	X	X	X	X
8	1.50	2.50	4.00	5.00	8.00	9.00	11.00	14.00	16.00	29.00	0.411	X	X	X	X
9	1.40	3.30	4.70	5.90	7.20	8.60	10.30	12.60	16.20	29.80	0.400	X	X	X	X
10	4.36	4.37	4.37	4.50	5.50	6.80	9.10	10.70	15.10	35.20	0.399		X		
11	2.96	4.24	4.56	5.60	6.40	7.44	9.28	10.56	14.08	34.88	0.398		X		
12	2.22	3.62	4.67	5.71	6.86	8.21	9.94	12.38	16.46	29.93	0.398				X
13	2.92	3.64	4.88	5.36	7.44	7.76	9.12	11.04	13.36	34.48	0.394	X		X	X
14	3.84	4.96	5.24	6.15	6.85	7.76	9.37	10.49	13.57	31.77	0.348		X		
15	2.13	4.44	6.16	7.28	8.32	9.48	10.86	12.52	15.05	23.76	0.312	X		X	X
16	5.60	6.40	6.60	7.25	7.75	8.40	9.55	10.35	12.55	25.35	0.249		X		
17	5.58	6.02	6.80	7.10	8.40	8.60	9.45	10.65	12.10	25.30	0.246			X	

Results of calculations

The results of the imposition of the stipulated income redistribution patterns will be summarized, country by country, in terms of GDP, employment, personal income, imports and savings. For each country results for a few alternatives will be used. Tables 3-6 include the following information:

(a) Ratio of the calculated value to the "base" solution value for the following variables:

Employment
GDP
Personal income
Private (household) savings
Imports

(b) Shares (percentage):

Share of personal income in GDP
Share of private (household) savings in personal income

(c) Values per employed person of:

GDP
Personal income

(d) Employment-income redistribution elasticities

Table 3. Consequences of stipulated alternatives of income redistribution: Iran, 1965

Indicator	*Version*	*Income redistribution alternative*				
		1	*7*	*8*	*9*	*13*
Employment						
Ratio (1 = 1.0)	I	1.00	1.06	1.07	1.07	1.05
	IIb	1.00	1.05	1.05	1.06	1.05
Elasticity	I		0.50	0.50	0.52	0.47
	IIb		0.41	0.37	0.43	0.50
GDP						
Ratio (1 = 1.0)	I	1.00	1.05	1.05	1.05	1.04
	IIb	1.00	1.04	1.04	1.04	1.04
Per employed person	I	77.5	76.3	76.2	76.2	76.5
(1 000 rials)	IIb	77.5	76.3	76.2	76.2	76.5
Personal income						
Ratio (1 = 1.0)	I	1.00	1.06	1.06	1.06	1.05
	IIb	1.00	1.06	1.06	1.06	1.05
Share in GDP (%)	I	0.72	0.73	0.73	0.73	0.73
	IIb	0.72	0.73	0.73	0.73	0.73
Per employed person	I	55.9	55.6	55.5	55.5	55.6
(1 000 rials)	IIb	55.9	55.6	55.5	55.5	55.6
Private savings						
Ratio (1 = 1.0)	I	1.00	0.87	0.86	0.84	0.90
	IIb	1.00	0.87	0.86	0.84	0.90
Share in personal income (%)	I	0.10	0.08	0.08	0.08	0.08
	IIb	0.10	0.08	0.08	0.08	0.08
Imports						
Ratio (1 = 1.0)	I	1.00	1.02	1.01	1.02	1.02
	IIb	1.00	1.02	1.01	1.02	1.02

Table 4. Consequences of stipulated alternatives of income redistribution: Malaysia, 1970 (version I of the model)

	Income redistribution alternative						
Indicator	*2*	*5*	*6*	*10*	*11*	*14*	*16*
Employment							
Ratio (2 = 1.0)	1.00	1.00	1.01	1.07	1.01	1.02	1.04
Elasticity		0.23	0.21	0.25	0.21	0.21	0.21
GDP							
Ratio (2 = 1.0)	1.00	1.00	1.00	1.01	1.01	1.02	1.03
Per employed person ($M 1 000)	3.84	3.85	3.80	3.80	3.80	3.80	3.80
Personal income							
Ratio (2 = 1.0)	1.00	1.00	1.00	1.01	1.01	1.02	1.03
Share in GDP (%)	0.66	0.66	0.66	0.66	0.66	0.66	0.66
Per employed person ($M 1 000)	2.52	2.52	2.51	2.50	2.50	2.50	2.50
Private savings							
Ratio (2 = 1.0)	1.00	0.95	0.96	0.92	0.91	0.87	0.79
Share in personal income (%)	0.13	0.12	0.12	0.12	0.12	0.11	0.10
Imports							
Ratio (2 = 1.0)	1.00	1.00	1.00	1.00	1.01	1.02	1.03

Table 5. Consequences of stipulated alternatives of income redistribution: the Philippines, 1965

		Income redistribution alternative						
Indicator	*Version*	*3*	*7*	*8*	*9*	*13*	*15*	*17*
Employment								
Ratio (3 = 1.0)	I	1.00	1.05	1.06	1.06	1.04	1.10	1.12
	IIa	1.00	1.02	1.01	1.04	1.05	1.05	1.08
Elasticity	I		0.46	0.48	0.51	0.51	0.53	0.64
	IIa		0.22	0.11	0.36	0.71	0.26	0.47
GDP								
Ratio (3 = 1.0)	I	1.00	1.03	1.04	1.04	1.03	1.07	1.07
	IIa	1.00	1.02	1.01	1.03	1.03	1.04	1.06
Per employed person (1 000 pesos)	I	2.69	2.65	2.64	2.64	2.65	2.60	2.59
	IIa	2.69	2.67	2.68	2.66	2.65	2.65	2.62
Personal income								
Ratio (3 =1.0)	I	1.00	1.03	1.04	1.04	1.03	1.07	1.08
	IIa	1.00	1.02	1.01	1.03	1.04	1.04	1.06
Share in GDP (%)	I	0.83	0.83	0.83	0.83	0.83	0.83	0.83
	IIa	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Per employed person (1 000 pesos)	I	2.23	2.20	2.20	2.20	2.20	2.16	2.16
	IIa	2.23	2.21	2.22	2.21	2.20	2.20	2.18
Private savings								
Ratio (3 = 1.0)	I	1.00	0.88	0.87	0.87	0.91	0.76	0.75
	IIa	1.00	0.94	0.95	0.90	0.88	0.86	0.79
Share in personal income (%)	I	0.10	0.09	0.09	0.09	0.09	0.07	0.07
	IIa	0.10	0.10	0.10	0.09	0.09	0.09	0.08
Imports								
Ratio (3 = 1.0)	I	1.00	1.02	1.03	1.03	1.02	1.05	1.05
	IIa	1.00	1.01	1.01	1.02	1.02	1.03	1.04

Table 6. Consequences of stipulated alternatives of income redistribution in the Republic of Korea, 1970

Indicator	*Version*	*Income redistribution alternative*				
		1	*4*	*5*	*12*	*15*
Employment						
Ratio (12 = 1.0)	I	0.99	0.99	1.00	1.00	1.01
	IIb	1.01	1.02	1.03	1.00	0.99
Elasticity	I	—	—	—		—
	IIb	—	—	—		—
GDP						
Ratio (12 = 1.0)	I	0.99	0.99	1.00	1.00	1.01
	IIb	1.01	1.01	1.02	1.00	0.99
Per employed person (1 000 won)	I	297	297	297	296	296
	IIb	296	294	295	296	296
Personal income						
Ratio (12 = 1.0)	I	0.99	0.99	1.00	1.00	1.00
	IIb	1.01	1.02	1.02	1.00	0.99
Share in GDP (%)	I	0.81	0.80	0.80	0.80	0.80
	IIb	0.80	0.80	0.80	0.80	0.80
Per employed person (1 000 won)	I	239	239	238	238	237
	IIb	238	237	237	238	237
Private savings						
Ratio (12 = 1.0)	I	1.07	1.05	1.02	1.00	0.96
	IIb	1.09	1.07	1.05	1.00	0.95
Share in personal income (%)	I	0.10	0.10	0.09	0.09	0.09
	IIb	0.10	0.09	0.09	0.09	0.09
Imports						
Ratio (12 = 1.0)	I	1.00	1.00	1.00	1.00	1.00
	IIb	1.00	1.01	1.01	1.00	0.99

Variables listed under *(a)* to *(c)* are easily understandable. In the calculation of the employment-income redistribution elasticities the magnitude of the employment increase in per cent has been related to the relative size (in per cent of total personal income) of the income shift from rich to poor, i.e., the increase in employment (in per cent) was divided by the income shift (in per cent).

The four countries can be roughly divided into two groups: the Republic of Korea and the other three. In the Republic of Korea the imposition of alternative stipulated income distribution patterns, more nearly equal or more unequal than the actual one, had almost no effect on the level of employment, of GDP, of personal income and of imports. The economy seems to be insensitive to shifts in the distribution of income.[9]

[9] This finding is in a certain respect close to the conclusions of the study by Adelman and Robinson [13]. They have found that the income distribution by size in the Republic of Korea is not sensitive to various policy measures. The same can be said about the findings by Gupta [14], who has projected the development of the economy of the Republic of Korea and has found that the Gini-coefficient will probably increase from 0.39 in 1976 to 0.41 in 1981 and to 0.44 in 1986, but fall to 0.43 in 1990. With respect to the assumed growth rate of 9.4 per cent per annum between 1976 and 1990, little change in the degree of inequality is expected.

In the case of Iran, Malaysia and the Philippines, the impact of the stipulated shifts in income distribution can be seen clearly; it differs, however, between version I and iterative versions IIa and IIb, being stronger in the former case. Progressive redistribution of income raises the level of employment and, to a lesser degree, the level of GDP and of personal income. There is also a slight increase in the level of imports. The level of private savings and their share in personal income decrease significantly. In Malaysia, however, the impact of progressive redistribution of income on the employment level is weaker than in Iran and in the Philippines. Apart from the openness of the Malaysian economy, one reason for this may be the lower share of total personal income in GDP (66 per cent as compared with 72 per cent in Iran and 83 per cent in the Philippines); another may be different shapes of the consumption function for imports and of the savings function (as will be seen later).

The differences in the magnitude of changes in employment, GDP and personal income imply a certain decline in the level of total output and of personal income per employed person (which can be seen in tables 3, 4 and 5, respectively). Owing to progressive redistribution of income, the structure of output shifts towards industries employing less productive and cheaper labour.

The interrelation between the income redistribution and employment can be described by the employment-income shift elasticities, which are comparable, since they are independent of the choice of "base" solution. These elasticities for version I of the model (which was equally applied in all these studies) are around 0.5 for Iran and the Philippines and around 0.2 for Malaysia. Version IIa, applied to the Philippines, gives values between 0.3 and 0.5; and version IIb gives values over 0.4 for Iran. This means that a progressive redistribution of 10 per cent of total income (possible medium-term policy target for a developing country with unequal income distribution), which for the three countries roughly corresponds to a reduction of the Gini-coefficient from 0.5 to 0.4, would raise the level of employment by 4 to 5 per cent in Iran and the Philippines and by 2 per cent in Malaysia.[10]

Factors of employment increase

In the input-output semi-closed simulation model, used in the four country studies, the stipulated shift in the distribution of personal income by size is the sole and "primary" cause of the change in employment. However, this shift cannot have a direct impact on the employment level; it works through other structural shifts caused by the redistribution of income. These direct, but secondary, causes (or channels) of the change in employment are the following:

(a) A change in the average income-savings ratio;

(b) A change in the average labour-output ratio;

(c) A change in imports, which can be subdivided into:

(i) A change in the level of imports for private consumption;

(ii) A change in the full content of intermediate import goods in private consumption;

[10] The results do not differ significantly from other input-output studies, in which simulated redistributions of income usually increase employment by less than 5 per cent. See Morawetz [9], p. 506.

(d) A change in the average share of personal income in value added;

(e) A multiplier effect of some of the changes listed above.

Since it was difficult to determine the magnitude of the impact of some of these factors on the employment level, only the following were considered: change in the income-savings ratio, change in imports for private consumption, multiplier impact of these two shifts, change in the labour-output ratio and impact of all other factors (as residual).

The analysis was carried out only for Iran and the Philippines and only for version I. In both cases the change in the income-savings ratio and the change in labour-output ratio had the strongest impact on the increase in employment. The former factor can be characterized as a typical Keynesian effect of progressive income redistribution in the direction of higher propensity to consume (which, in the semi-closed model, is roughly doubled by the multiplier effect). The latter factor results from the shift in the structure of private consumption towards more labour-intensive industries. The change in the demand for imported goods for private consumption had a negligible effect; the residual was small.

The strong impact of the reduction in savings and negligible impact of the reduction in direct imports for private consumption are interesting and deserve further clarification.

Income distribution by size and private consumption of imported goods

In no country do household expenditure surveys provide separate data on the expenditure on domestically produced and imported goods. For the semi-closed input-output model such data were estimated using information on private consumption of imported goods by industries from input-output tables and information on the pattern of private expenditure by household deciles from household expenditure surveys. It was assumed that the share of imports in private consumption differs by industry but does not change by deciles for a given industry. For goods imported for private consumption a simple aggregate consumption function was estimated. The consistency of these estimates was established by the RAS method.[11] These resulting consumption functions for direct imports for the four selected countries are presented in table 7.

The share of direct imports in private consumption was high in Malaysia and the Philippines and low in Iran and the Republic of Korea. The shape of the consumption functions for all countries contradicts the hypothesis that the rich have a very high propensity to consume imported goods and explains why the "import-substitution" channel plays a minor role among the factors that transmit the change in income distribution by size into an increase in employment.

[11] By this method the preliminary estimates of the elements of the consumption matrix are adjusted to a column of totals (which contains information on private consumption of domestic output by industries and on direct imports) and to a row of totals (which contains information on personal incomes by deciles) by an iterative procedure. This procedure makes the elements of the consumption matrix consistent with the row and column totals but keeps them proportional to the original values by both row and column. The method was developed in the early 1960s at the Cambridge University (United Kingdom) and is known as the RAS method.

Table 7. Private consumption of imported goods by deciles, as percentage of total private consumption

Household decile	Country			
	Iran	*Malaysia*	*Philippines*	*Republic of Korea*
1	3.24	18.11	9.82	4.50
2	3.35	14.99	9.96	3.99
3	3.55	14.34	9.89	3.99
4	3.66	14.60	10.55	3.68
5	3.52	13.22	10.81	3.65
6	3.88	12.84	10.83	3.64
7	3.91	12.57	10.98	3.43
8	4.36	12.50	11.34	3.42
9	4.68	12.63	12.07	3.27
10	6.11	12.24	12.38	2.26

Income distribution by size and household savings

Contrary to the "import-substitution" channel, the change in the average income-savings ratio is an important factor that transmits the shift in the distribution of income into a change in the level of employment. Moreover, the multiplier effect doubles in the model the magnitude of the primary impact.

Estimating the savings functions for the four countries was not easy. Information was scarce, and owing to the linearity of the model and constancy of the savings coefficient, negative savings of the lowest income classes had to be put equal to zero. The savings functions for the four countries are presented in table 8.

Table 8. Income-savings ratios by deciles (savings as percentage of total personal income)

Household decile	Country			
	Iran	*Malaysia*	*Philippines*	*Republic of Korea*
1	—	1.51	—	—
2	—	2.88	—	—
3	0.52	3.31	—	—
4	1.56	4.27	—	0.94
5	1.42	4.79	—	7.34
6	3.25	5.62	—	12.77
7	4.20	7.08	4.65	14.77
8	5.59	8.13	8.88	9.27
9	7.64	10.23	10.32	7.75
10	17.19	21.40	18.92	11.70

Of the four countries, Iran, Malaysia and the Philippines have high income-savings ratios, whereas the Republic of Korea has a low one. The shapes of the savings functions are different. In the Philippines positive savings appear only in the seventh decile (for the lowest six household deciles the household expenditure statistics report negative savings, which in the model were put equal to zero). In Iran and the Republic of Korea, positive savings start with the third and fourth decile, respectively. The savings function for Iran is steep in the top decile; in the Republic of Korea income-savings ratios are high at the middle of the income scale (this surprising irregularity is well documented in the original data sources). The savings function for Malaysia is surprisingly steady. Positive savings appear even in the lowest income decile. The income-savings ratio increases steadily up to the top decile, in which it is, however, higher than in any other country of the sample. The savings functions for Iran, Philippines and Republic of Korea have one important common feature: there are no or almost no savings in the lowest five deciles; almost all savings originate in the top five deciles. This explains why a progressive shift in the distribution of income causes a significant change in the average income-savings ratio, raises the level of private consumption and has (also thanks to the multiplier effect in the model) a strong employment effect. In Malaysia, on the contrary, the shape of the savings function may be partly responsible for the low employment-income redistribution elasticity.

Tentative conclusions

The aim of the case-studies for four developing Asian countries was to quantify the impact of hypothetical (stipulated) shifts in the distribution of income by size on the structure and level of economic activities and, in particular, on the level of employment. The calculations were carried out with a semi-closed input-output model in which a compromise was made between the complicated nature of the problem under investigation and the not always reliable or available statistics in the developing countries.

The four case-studies provided general information on the recent economic performance of the four countries, on the economic policies pursued, on their economic structure, institutional set-up and, in particular, on the actual distribution of income by size. The results of calculations with the model have shown the magnitude of the shifts in economic structure and employment, which would (under the assumptions on which the model is based) be the consequence of certain hypothetical (stipulated) shifts in the distribution of income by size.

The most important finding is surprisingly simple. The sample of the four countries includes one country with a rather egalitarian distribution of income, namely, the Republic of Korea, and three countries with more unequal distribution, Iran, Malaysia and the Philippines. The application of the model to the Republic of Korea has shown that a redistribution of income will bring almost no changes in the structure of the economy and in the level of employment. The application of the model to the other three countries has shown a certain positive impact of progressive redistribution of income on the employment level. It seems that the difference between the Republic of Korea and the other three countries indicates that a relatively egalitarian distribution of income has to be built into the economy and cannot be imposed by simple income-redistribution measures.

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Books

Planning with the Semi-Input-Output Method: with Empirical Applications to Nigeria
by Arie Kuyvenhoven
Leiden, Martinus Nijhoff Social Sciences Division, 1978

Books of interest to development planners, policy analysts and project evaluators alike are rare; for although these subjects are closely connected in their theoretical foundations of social welfare and optimization, they differ considerably in their methodological tools and perception of issues. The book under review is important in that, by elucidating many of the linkages between these subject areas, it contributes towards a synthetic view of the issues with which they are commonly concerned.[1] Furthermore, although requiring some mathematical background on the part of the reader, the book provides the best currently available exposition of the semi-input-output method (SIOM), which has remained little used since first described by Jan Tinbergen in the early 1960s largely because of a lack, in this reviewer's opinion, of any clear, readily obtainable publication on the subject.

Briefly, SIOM provides a way of assessing the desirability of "complementary bunches of investment" by breaking down an input-output table into international sectors, where changes in domestic consumption may be adjusted for through changes in imports or exports, and national sectors, where consumption and production change together. A "bunch" consists of national sectors with input-output linkages, but with the linkages terminating at stages in the input-output chain where international sectors appear, rather than at the end of the complete input-output chain. This is done because trade permits a break in connections with the rest of the economy. Thus, instead of being required to analyse investment decisions simultaneously throughout the economy as would be desirable in a "balanced growth" strategy, each bunch of investment can be assessed independently on the basis of comparative advantage, using an appropriate set of prices. These may be defined as accounting prices equivalent to, for traded commodities, border prices, and, for non-traded commodities, the cost of direct or indirect inputs of primary factors and traded commodities (as in the Corden concept of effective protection).

Much of the book is concerned with explaining how SIOM can be used in the middle stage of a three-tier planning process consisting of macro planning, sectoral planning and project planning. The logic of this may be seen by comparing the bunch investment concept of SIOM with the total and individual investments with which overall planning and project planning, respectively, are concerned. The author shows how SIOM, although a partial-equilibrium technique, fits into various linear programming and other planning models. He shows its close relation to Bruno's measure of the domestic resource cost (DRC) of foreign exchange, to the theory of effective protection and to standard project cost-benefit analysis, especially that of Little and Mirrlees. Other concepts such as the "effects" method of project evaluation and Hirschman-type linkage criteria are shown to conflict with SIOM.

[1] See also *Industrial Priorities in Developing Countries: The Selection Process in Brazil, India, Mexico, Republic of Korea and Turkey* (United Nations publication, Sales No. E.78.II.B.12), chap. I.

To demonstrate its empirical value, Kuyvenhoven analyses 106 sectors of the Nigerian economy using SIOM. The case-study shows that even with limited availability of basic data SIOM may be used to indicate sectors deserving greater or less investment. It also makes clear, however, some of the practical difficulties inherent in the application of SIOM (and, it may be added, similar methods such as DRC).[2]

First, trade limitations will affect the distribution of bunches of sectors, creating policy-imposed national sectors (tradables become non-traded) or even policy-imposed international sectors (non-tradables become traded). Rather than attempting an empirical investigation of such effects, Kuyvenhoven imposes artificial trade limitations. Secondly, accounting prices of factors and commodities are chosen on the basis of minimizing cost, rather than on the basis of an objective function reflecting Nigerian national goals; and such accounting prices are estimated using very rough procedures. No justification is given for the cut-off rate of net social profit that Kuyvenhoven seems to consider acceptable. Finally, and this criticism applies to all planning procedures, no attempt is made to deal with expectations and uncertainty concerning demand and supply trends, and thus future prices. Given these problems, Kuyvenhoven's case-study must be considered illustrative and the results tentative.

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The International Monetary System and the Less Developed Countries

by Graham Bird
London, Macmillan Press, 1978

Graham Bird claims, rather modestly, that his book is "primarily designed for undergraduates who are studying either international economics or development economics or both, but it is hoped that postgraduates will find certain chapters of interest". In fact, the book presents a well-documented account of the development of the institutions and mechanisms of the international monetary system, together with critical appraisals of their impact on developing countries. The author is clearly aware that between Bretton Woods and the 1970s, the international monetary system was designed by and for the Organisation for Economic Co-operation and Development (and really the Group of Ten) countries, taking little account of the needs of developing countries. However, he does not let this awareness become polemical, and thereby spoil the balanced presentation of his material. The book is clearly written, for an economics book.

However, it must be said that the book is uneven in parts. The treatment of export instability and the commodities problem is good, and the detailed account and critique of the operation of the many financial facilities incorporated in the International Monetary Fund (IMF) is excellent. By contrast, the treatment of commercial sources of finance and the Eurocurrency market is rather thin, given its substantial (and growing) importance as a supplier of finance to developing countries. The author does discuss some of the recent proposals for alleviating the problems

[2] Most of the conceptual problems associated with cost-benefit analysis and shadow pricing also apply to SIOM.

faced by the developing countries, such as commodity funds and increasing the number of special drawing rights by the IMF to provide further funds for aid.

The most serious omission weakness is probably the failure to discuss the shift in the balance of international financial power following the oil price increases, and the use of the Eurocurrency market to recycle the capital accumulated by the means of the Organization of the Petroleum Exporting Countries (OPEC). The existence of large OPEC capital surpluses can be seen as the first (and perhaps only) real manifestation of a new international economic order, and these funds have the potential to reduce the dependency of the developing countries on the financial institutions of the North, especially IMF. Nor does the author mention the various regional monetary funds that have been set up within the developing world to provide balance-of-payments support to members in difficulties, thereby possibly avoiding the sometimes inappropriate conditions attached to IMF borrowing.

Throughout the book, the author seems unwilling to extend his criticisms of the existing system or to make recommendations for changes. Only in the introduction does he raise the fundamental question about the proper relationship between the international monetary system and development, the historical assumption that what is good for developed countries is also good for developing countries. While acknowledging that developing countries have a case for some measure of reform, he discusses only proposals that involve minor tinkering with IMF.

It is worth noting that the IMF role in the management of industrialized economies has been drastically reduced, with the advent of floating exchange rates, central bank swap arrangements and now the European Monetary System. Thus it is left in the incongruous position of being predominantly concerned with the problems of developing countries and armed with an apparently inflexible package of conditions (internal deflation, exchange rate devaluation and trade liberalization) that may be quite inappropriate and contrary to continued economic development. At the same time, its policies and management are dominated by the industrialized countries. It is questionable whether the continuation of the existing IMF provides the developing countries with the type of institution, financial packages or economic management that they need. Rather than tinkering with the existing IMF they might consider establishing another institution of their own on the basis of OPEC funds and existing regional funds.

Likewise, on the subject of commercial borrowing, the author recognizes the threat that instability in the Eurocurrency market may pose for developing country borrowers and suggests that developed or oil-exporting countries should be prepared to guarantee loans. This suggestion may be sound for the least developed countries, which do not otherwise have access to the market. However, the author does not recognize the potential threat to developing country borrowers if recent proposals by central bank chiefs of industrialized countries to regulate the Eurocurrency market come to fruition. Developing countries should become actively involved in such discussions to protect their interests.

To sum up, the book provides a useful description of the present international monetary system and a good analysis of some of the external financial problems facing many developing countries. However, it fails to take the opportunity to emphasize the current problems and to make recommendations for future change.

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World Development Report, 1980
Washington, The World Bank, August 1980

This *Report* is the third in a series issued by the World Bank designed to provide a comprehensive continuing assessment of global development issues. Like its predecessors, it forecasts growth prospects for the developing countries until 1990 and concentrates on an analysis of specific development policies. The *1978 Report* and the *1979 Report* had spelt out a strategy for dealing with constraints on the low-income and the middle-income countries. Human resource development policies are analysed in the current issue, and an attempt is made to assess the contribution such policies can make to a reduction of absolute poverty in the third world.

The *1980 Report* is aimed at policy makers in developed and developing countries and at the informed layman. It avoids technical discussions and economic jargon and attempts to present a synoptic evaluation of extensive research on human resource development issues in a simple and easily comprehensible manner. The danger inherent in this approach is that the reading public generally tends to ignore the many qualifications with which policy and analytic conclusions are hedged, and treats these conclusions as firm evidence of the existence of certain trends and the superiority of certain policies. The *1980 Report* admits that "the estimates this year should be treated with more than usual caution (page 6), and Mr. Robert S. McNamara, President of the World Bank, notes in the foreword that "the projections are not intended to . . . provide precise forecasts". The reviewer of the *1980 Report* in the *Financial Times* considers "The World Development Report . . . as an important document (because) it provides the most authoritative forecasts of the prospects of the developing countries".[1] However, growth forecasts in the three editions have been the subject of revisions (which can be regarded as modest). The *1978 Report* (page 5) forecast an average annual GNP growth rate of 5.7 per cent for all developing countries over the period 1975-1980. The *1979 Report* (page 4) forecast an average annual growth rate of 5.2 per cent. It is shown on page 99 of the *1980 Report* that developing countries grew at a rate of 5.3 per cent over the period 1970-1980. Doubts are also cast in the *1980 Report* on the earlier projections for "reviews of some historical aggregates" with the result that "the projections of this *Report* are not directly comparable to those of last year's" (page 6).

Current World Bank projections are more pessimistic than in 1979. The *1979 Report* presented three scenarios for the developing countries. The present *Report* presents two—"a Low case, which is comparable to last year's Low case and a High case which is closer to last year's Base case than its High case" (page 6). It is argued on the same page that "without a strong policy response during the adjustment period, the Low case is the more likely outcome", yet "the High case remains achievable—depending on policies in four key areas: the growth and structure of international trade; the changing pattern of energy production and consumption; investment and productivity in the developing countries; and the inflow of capital". In the high-case scenario, developing countries' exports grow by 5.5 per cent over 1980-1985 and by 6.4 per cent during 1985-1990. This would allow developing countries to increase their share of world exports from 20.1 per cent in 1977 to 21.3 per cent in 1990. In the high-case scenario, industrialized countries would also increase their share of world exports from 62.9 per cent in 1977 to 65.6 per cent in 1990, while others—presumably the centrally planned economy countries—would

[1] D. Hourego, "Skating on thin ice at best", *Financial Times*, 8 August 1980, p. 15.

experience a reduction from 17 per cent of world exports in 1977 to 13.1 per cent in 1990.

Furthermore, in the high-case scenario, developing countries are projected to increase gross domestic investment from 24.6 per cent of GDP in 1980 to 25.6 per cent by 1990. This would require an increase of domestic saving from 22.4 per cent to 24 per cent of GDP over the same period. Total external finance required by the developing countries is expected to increase from $74.6 billion in 1980 to $177.9 billion in 1990. Net imports of oil are expected to increase from $57.8 billion in 1980 to $198 billion in 1990 (pages 7-10).

The *1980 Report* identifies a number of factors which have adversely affected the growth prospects of the developing countries. Strong emphasis is placed on the negative impact of the rise in the real price of oil on the one hand, and on the continuing recession in the Western countries on the other—"the international economic outlook poses particularly difficult choices for policymakers in the 1980s" (page 14). Western commentators are bound to stress the impact of the oil price rise on development prospects—thus the *Financial Times* regards "the present recession (in the West) as the second major jolt to growth". The World Bank itself does not present a view on the relative importance of energy conservation, trade liberalization, domestic savings and investment acceleration and international financial reform as contributants to third world development, but it suggests a variety of means for reducing the price and increasing the supply of energy sources—particularly oil. However, there is no attempt to estimate prices of other major imports of the third world—such as capital equipment, fertilizers and technology—and no policy prescriptions for improving the terms at which the developing countries can obtain these items. This is somewhat surprising, for although the real price of oil fell significantly during the period 1974-1978 and the *1980 Report* itself on page 9 predicts that "By the mid-1980s, however, the real value of oil export earnings is likely to be falling for some countries", there is little reason to believe that a general improvement in the commodity terms of trade of developing countries will occur in the foreseeable future.

The *1980 Report* "strongly endorses the Commission's (Brandt) emphasis on the interdependence—through trade, energy and capital flows—of all countries, as well as its emphasis on the importance of renewed efforts to reduce worldwide poverty" (page 13), but there is no attempt at evaluating the possibility of instituting some of the specific proposals of the Brandt Emergency Programme for 1980-1985 in the areas of resource transfers, energy or food.[2] Indeed, a striking feature of the *1980 Report* is that though "its projections are not directly comparable" with that of the *1978 Report* or the *1979 Report*, and though its forecasts have become increasingly bleak, "essential policy initiatives (advocated in the *1980 Report*) remain as described in last year's *World Development Report*" (page 18). There is the same emphasis on trade liberalization, the same advocacy of efficient investment policies, and the same concern with the need to promote credit-worthiness in order to attract commercial capital. The *Reports* may thus be rightly regarded as documents embodying the basic development ideology of the World Bank. They provide evidence that the Bank's commitment to the ideology of economic liberalism remains unshaken despite the economic difficulties that have beset the Western countries since the early 1970s.

[2] *North-South: A Programme for Survival.* Report of the Independent Commission in International Development Issues. London, Pan Books, 1980, pp. 276-282.

This commitment to economic liberalism is also evident in the *Report*'s eclectic review of the research on poverty eradication and human development. The eradication of absolute poverty is considered to be identical with the achievement of higher levels of consumption. The *1980 Report* does not consider the relationship between the distribution of wealth and economic power and the distribution of income, and states that "There is general agreement that growth, in the very long term, eliminates most absolute poverty" (page 35). In its identification of poverty groups the *1980 Report* makes no mention of the marginalized people forced off the land by the expansion of commercialized agriculture and the inroads of mining and industry. Such groups include the nomads of the Sahel, the hill tribes of Assam and Burma, and the Aborigines of Australia. In the past, many such groups have chosen ethnic extinction to absorption within commercial civilization. In such cases elimination of poverty has meant the elimination of the poor. The emphasis upon accelerated commercialization through the advancement of technical education, the growth of mechanization, the substitution of market-oriented farming for use-oriented agriculture, the break up of self-sustaining joint family units and reduced governmental subsidization of uneconomic projects may well lead to physical and cultural destruction on a scale which is unprecedented in recorded history.

The point is that poverty eradication and human development are intensely complex processes. It is meaningless to talk of the existence of consensus on the need to expand programmes for primary education, promoting the establishment of health facilities or raising nutritional standards. Such a consensus is expressed through policies which are articulated as part of national political processes which determine both the content of these programmes and the relative importance that governments attach to investment in them. In general this *Report* and its predecessors have argued that existing international market prices provide the best signals for investment allocation within developing countries. The question is whether the structure of world market prices provides adequate signals to ensure the allocation of the right amount of investment to the right types of human development services.

If existing world market prices do not provide correct investment signals for poverty eradication in developing countries, or if government policies distort these signals, we must address ourselves to the task of influencing processes that determine international prices and government policies. In general the *1980 Report* does not seek to explicate processes of policy formulation in the area of poverty eradication, trade, international finance, energy and domestic resource mobilization. The aggregate trends identified by its forecasting model reflect the policies of diverse economic actors—including state bureaucracies, transnationals, trade union leaderships, agricultural lobbies, wholesale and retail trading groups etc. It is the continuous interaction between these market forces which determines market prices and, particularly in oligopolistically structured markets, the scope for influencing price-formation processes through bargaining is extensive. Policy making, particularly in the West, where the political process is characterized by a high degree of pluralism, is a multifaceted process, and the ultimate outcome invariably represents a compromise between opposing and competing interest groups. Therefore, attempts at inducing a modification of policy must take into account the process of policy making and implementation in specific areas. The *1980 Report* does refer to the importance of political factors in, for example, the emergence of the new protectionism; but its treatment of this whole question is too general and sweeping.

However, it does not analyse the policies of non-governmental actors—a crucial omission that gives a slightly unreal air to its recommendations. Whatever the eventual welfare gains that are to be had from liberalizing trade, stabilizing energy supplies and increasing facilities for commercial borrowings, implementation of these measures in the real world invariably involves negotiations concerning the distribution of benefits and costs among parties having different objectives. Such bargaining acquires particular significance where competitive forces are not at work and markets are oligopolistically or monopolistically structured. The *1980 Report* tends to ignore the importance of these negotiations by refusing to discuss policies of any economic agent except Governments. The arguments in favour of a liberal international economic order can best be substantiated by identifying areas of convergence in the policies of the Governments of developed market-economy and developing countries on the one hand, and transnational corporations on the other, and suggesting ways of resolving conflicts. To write a report on world development in the late twentieth century and omit a discussion of the strategies of the transnational corporations is akin to staging Hamlet without the Prince of Denmark.

Implicit in the *1980 Report* is a rough division of labour between Governments and what it calls market forces. Governments are supposed to guarantee the liberal international economic order and to concern themselves with questions of equity. Market forces, i.e. transnational corporations and domestic private investors, will take care of growth, promote a more efficient allocation of resources and integrate world industry. The *1980 Report* does not demonstrate that such a division of labour will automatically eliminate conflict between the transnationals and Governments. Thus, an export-oriented industrialization strategy may limit the role of the transnationals, particularly if the emphasis is on intra-South trade. Vaitsos notes that the transnationals "are not likely to contribute at least in the medium run to world relocation of manufacturing exports through high exports from developing countries."[3] Other authors have noted the reluctance of the transnationals to expand exports in markets controlled by subsidiaries of the same company.[4]

The point is that there are areas of convergence and areas of conflict between governmental and non-governmental actors in the field of international trade and investment. It does not serve any useful purpose to assume that either conflict or harmony is inevitable. Analysis must concern itself with an explication of both similarities and differences in objectives and strategies of national interest groups, transnational corporations and Governments. Such an analysis could provide a focus for meaningful negotiation between different parties. There is a need to draw non-governmental actors—transnational corporations, consumer groups, trade unions, aid support agencies—into the negotiations on a new international economic order, and the United Nations family of international organizations can play a vital role in undertaking this task.

The *1980 Report* does not explicitly take note of the extensive literature produced by the United Nations agencies on the construction of the New International Economic Order—although mention is made on page 13 of the OECD

[3] C. Vaitsos, "World industrial development and the transnational corporations: the Lima target as viewed by economic actors", *Industry and Development*, No. 3 (United Nations publication, Sales No. E.79.II.B.2).

[4] M. Radetzki, "Where should developing country minerals be processed? ", *World Development*, No. 5, 1977. See also L. Chung, "Sales of majority owned foreign affiliates of US companies, 1975", *Survey of Current Business*, vol. 57.

study, *Facing the Future*. This will reduce the usefulness of the document in the negotiations due to begin in September 1980, at United Nations Headquarters. Similarly, the *1980 Report* is eclectic in the presentation of statistical evidence. Capital account balances for the industrialized countries are not presented. The development experience of the East European countries—particularly in dealing with poverty—is not drawn upon, although China is frequently mentioned. The political instability of some regimes with liberal economic policies is not recognized.

All this leaves one with the strong impression that the *1980 Report* is primarily concerned with delivering the simple message that fundamental structural adjustments that impede growth are too expensive and ought to be postponed. It ignores the entire "Limits to Growth" literature and the extensive work of the Environmentalists in its advocacy of the necessity of growth. It uses GNP *per capita* as the sole growth criterion—a variable that has been regarded since the 1960s as an inadequate measure of economic prosperity. Moreover, there is not now nor has there ever been—a consensus on the view that satisfying market demand and ensuring its sustained buoyancy is a prime means for achieving social justice and increasing economic welfare. The re-ordering of individual preferences and the enhancement of the global bargaining power of relatively weak economic agents may also be regarded as essential elements of a development strategy that aims at constructing a New International Economic Order.

JAVED A. ANSARI

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